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SOMETHING ABOUT DEEP-SEA SOUNDING.

In the Naval Appropriation Bill, approved 3d March, 1873, it was enacted, "That the Secretary of the Navy be, and he hereby is authorized to make soundings between the western coast of the United States and Japan for scientific purposes, and for the purpose of determining the practicability of laying a telegraph-cable between those points."

Pursuant to that enactment the U. S. S. "Tuscarora," under the writer's command, then serving in the South Pacific, was detached from that station and ordered to San Francisco to refit for the special duty indicated. Such orders were unexpected and the duty entirely different from the routine of ordinary cruising. No one on board had had any experience in deep-sea work, but had heard much of its difficulties; it therefore behooved those most concerned to master the subject as thoroughly as possible. Let us on the passage up from Panama to San Francisco, take a retrospect of what had already been done towards ascertaining the depths.

Perhaps no problem ever presented itself to seamen which so long awaited satisfactory solution as that of deep-sea sounding, and nothing approaching the true depth of the sea was known until within a period embraced within the average lifetime of man; all effort before had been uncertain and unsatisfactory, and indeed, without disparagement of the work done by Parker, Platt, Taylor, Walsh, Davis, Stellwagen, Sands, Rodgers, Craver, Ringgold, Brooke, Lee, Berryman, Mitchell, Irwin, and others of our service; Scoresby, Ross, Sabine, Wauchope, Beaufort, Barnett, Denham, Dayman, McClintock, Johnson, Shortland, Chimmo, Hoskyn, and Calver, of the English service; Dupetit-Thouars, of the French Navy, and officers of other European services; it is safe to say that more progress has been made in determining the depth and char-

acter of the bottom of the ocean during the past five years than for all time previously.

The impartial student, whether American or European, will accord the U. S. Naval Service and Coast Survey merited prominence in diligent and persistent effort, inventive appliance, and intelligent adaptation of ideas and methods, from whatever source, towards the satisfactory solution of the problem; but it was the good fortune of Sir William Thomson, of Glasgow University, to conceive the best and simplest means of measuring the depths; and to-day, thanks to his genius, it is as easy for the questioning seaman or scientist to bring back answer from the depth of five miles as it formerly was from a depth of quarter of a mile. Let it not be forgotten, however, that in these later days of research steam has come to the aid of the laborer in every field, and nowhere does the masterful power of that fierce agent find better illustration than in its triumphs on the restless and turbulent sea, enabling the seaman to do now with ease and certainty what would have been regarded as impossible and visionary half a century ago.

The great difficulty of sounding in "blue water" arose from the fact that, as the plummet descended, the weight of the line and ever-attendant friction and action of submarine currents increased to such an extent that the line would continue to run off from the reel after bottom was reached simply from its own weight; the moment of touch could not be told, and the wildest results were reported. The line too, soaked with water, became so heavy that it often broke in hauling back, and the work of hours on such occasions seemed only to demonstrate the seeming impossibility of getting at the depths.

Captain Denham, R.N., reported finding a depth of forty-six thousand feet, or of more than eight statute miles, in the South Atlantic, and Lieutenant Parker, of the U. S. frigate "Congress," in an attempt made from a boat off the coast of Brazil, ran out fifty thousand feet of twine without, as he thought, getting bottom.

Rope, cod-line and spun-yarn, fine silken lines, and strong waxed twine had been tried, both with heavy and light sinkers; and in August, 1849, Captain Barnett, of H. M. S. "Thunder," at the suggestion of Lieutenant Mooney of that ship, made the first attempt with wire.

The wire was of iron, varying in size from Nos. 1 to 5, wound on a small reel, and the sinker used weighed sixty-one pounds. The wire broke at two thousand fathoms, and no further trial seems to have been made. It had run out in twenty minutes and fifty-three seconds, which was rapid work, indicating that no restraint had been put on the reel, and the break was doubtless due to the parting of a splice or a jerking strain, caused by the rolling of the ship. This attempt was made between the Banks of Newfoundland and the Western Islands.

Three months later, the same year, Lieutenant J. C. Walsh, U.S.N., in the U. S. schooner "Taney," experimented with English steel wire

some four hundred miles east of Bermuda. The wire broke when five thousand seven hundred fathoms, or more than six and a half statute miles, had run out, and Walsh reported no bottom at that great depth, believing the sounding to be accurate up to the time the wire broke; the fact was that bottom had been reached when half the wire had run out. The wire used was of three sizes, Nos. 5, 7, and 8, Birmingham gauge, and its weight in water about one hundred and eighty pounds to the statute mile. It was wound on an iron reel, fitted with brakes, or friction-bands, for its better control in working, and swivels were fitted next the sinker and at every thousand fathoms, to counteract the tendency to twist. The lengths were marked with copper labels, and the sinker weighed only ten pounds; but six pounds more may be added for the weight of the registering machine devised by Maury, and used on this occasion. It is hard to conceive the reason for using so light a lead with so heavy a wire, the No. 5 size being 0.22 inch in diameter,—for with less than two hundred fathoms out the weight of wire would already exceed that of the sinker, and the momentum and influence of the latter be absorbed or swallowed up, as it were. Had the sinker weighed four hundred pounds, which the size and strength of the wire readily admitted, the first trial would probably have been successful, taking it for granted that the descent of the lead was controlled and moderated by the friction-brakes. Subsequently several other trials were made from the "Taney" with the wire, but with no better results, the wire generally breaking at the comparatively moderate length out of two thousand fathoms. The cause of these repeated losses does not seem to have been mentioned by Walsh, but if the reel remained wet with sea-water, the copper labels in contact with the wire would induce galvanic action sufficient to weaken the wire at the points of contact in a short time, and readily account for the breakage. Walsh had a quantity of smaller wire stowed away, and it was perhaps unfortunate that he did not try it after the failures with the larger sizes, though had he persisted in the use of so light a lead the results would undoubtedly have been the same. These experiments with wire, in our own and the English service, seem to have convinced the naval mind of the uselessness of further attempt in that direction, and the idea slumbered until awakened by the magic touch of Sir William Thomson's hand, twenty-three years later, transforming failure into pre-eminent success. The general impression has been that an American naval officer was the first to try wire for sounding, but that honor must, the writer thinks, be conceded to our cousins across the water.

These failures in nowise discouraged those interested in deep-sea research; the U. S. Coast Survey kept actively at work surveying the coasts of the Atlantic, Pacific, and Gulf of Mexico, exploring the Gulf Stream for depth and temperature, and devising new methods and appliances for the advancement of hydrographic science; while Maury,

the Superintendent of the National Observatory, and in charge of all matters pertaining to Navigation, under cognizance of the Bureau of Ordnance and Hydrography at that period, stimulated effort on the part of the Naval Service.

It may not be amiss to remark here that as so much of the hydrographic work of the Coast Survey is, and has been, done by officers of the Navy, both branches of the service may be considered as one in that respect, though under different heads; at least, the Navy claims to share in the well-earned reputations, inventive skill, and achievements of those able assistants to the Coast Survey and accomplished hydrographers, Gedney, Lee, Blake, Davis, the Baches, the Rodgers, Alden, Craven, Maffit, Stellwagen, Sands, Ammen, Almy, Febiger, Johnson, Howell, Sigsbee, and other compeers of the profession.

But to return from this digression. When the wire had been discarded it was thought stout twine might be made available for the purpose, using comparatively heavy sinkers; and after some experiments and discouragement with the average article to be found in the market, the men-of-war desiring it were, at the instance of Maury, furnished with small-sized twine of exceptional strength, especially made for the purpose, and weighing eight and three-quarters pounds to the statute mile. It was wound on reels containing ten thousand fathoms each, constructed to run as lightly as possible, and 32-pounder shot were selected for sinkers, as available in every ship of war at that period (1850), and inexpensive.

The first approach to success achieved with these appliances was on board the U. S. S. "Albany," Commander Platt, in the Gulf of Mexico and Caribbean Sea, and under the personal supervision of the executive officer, Lieutenant (now Rear-Admiral) William Rodgers Taylor. The work was not continuous, but embraced a period of a year or more of ordinary cruising, and such opportunities as the weather afforded. Many thousand fathoms of twine were expended,—forty thousand fathoms in six months; and while, towards the last of the series of casts made, they were pretty confident of having measured the depths with tolerable accuracy,—the method of time intervals having been tested and adopted,—no sinkers had been hauled back; for though the twine would bear a weight of sixty or seventy pounds in air without breaking, it would not bring back a 32-pounder shot from a greater depth than a hundred fathoms, due in part perhaps to weak places in the twine, but mostly owing to the wonderful retarding influence of friction. Waxing the twine diminished the frictional resistance somewhat, but not enough to permit the sinker to come back to gladden the eyes of the anxious and patient inquirers.

Lieutenant-Commander T. F. Jewell, U.S.N., says, in his interesting and valuable lecture on deep-sea sounding, delivered before the U. S. Naval Institute, December, 1877, that it was at Maury's sug-

gestion Taylor adopted the idea of noting the time intervals, which idea proving measurably successful, was taken up by all subsequent explorers, and was the main reliance in determining the accuracy of deep-sea work until the invention of the Thomson machine superseded and rendered such method practically obsolete, at least with American workers.

Tables were constructed for different weights of sinkers and sizes of lines, showing the rate of descent of each hundred fathoms, and any marked or disproportionate increase in the intervals of time would indicate the reaching of bottom; but the observer would need to watch the line sharply, and become very familiar with all the indications, to interpret correctly anything like the moment of touch; hence a good deal of line often ran out before it was discovered that the lead was on the bottom, and some of the soundings reported by Lee and Berryman, of the "Dolphin," were in excess of the actual depth, as subsequent research has shown, and, as Lieutenant-Commander Jewell thinks, was indicated by the time records of descent tabulated in their reports.

While these experiments on board the "Albany" were still in progress, Lee (the present Rear-Admiral S. P. Lee) was detailed in the "Dolphin" brigantine for the special duty of "testing new routes, and perfecting the discoveries made by Lieutenant Maury in the course of his investigations of the winds and currents of the ocean," and he was instructed to make deep-sea soundings in favorable weather, as "the depth of the ocean is an important element towards a perfect understanding of the tides, their laws of motion, the course and form of tidal waves," etc.

Lee completed his fittings and equipments, and put to sea from New York October 8, 1851. The sounding apparatus supplied was similar to that tried on board the "Albany," modified and improved by the experience of that vessel; but Lee adopted the idea of sounding from a boat instead of from the deck of the brig, believing that the lighter motion of the former would be less trying to the strength of the line, and that a boat, by means of her oars, could be readily kept over the line and give a plumb sounding,—a thing impossible from a ship unless controlled by steam.

Their manner of doing things is perhaps best described by Lee himself, in a memorandum furnished his successor in command, Lieutenant O. H. Berryman: "Used small fishing-line, as per sample, smoothed with wax, marked to each one hundred fathoms with a small piece of colored bunting, just large enough to be seen when running, attached to a 32-pound condemned shot (a long-pointed lead would be better).

"The first three hundred fathoms of this line was doubled, and in some cases the first one hundred was tripled. Marked the time of letting go the shot, and the time at which each one-hundred-fathom mark passed out, and carried the interval into another column.

"The line ran through a small 'bull's-eye,' held in one hand by a quartermaster, who gave line with the other hand when necessary, to relieve the shot from the resistance of the reel.

"The reel was mounted on a braced stand just forward of the stern-sheets of the boat, and turned on friction rollers. Whilst the line was running out some oars were pulled, just so much as to keep the line plumb, the boat being kept by the stern-oar head to wind. When the shot struck bottom, stopped pulling, let the boat settle, and tried currents if the line did not part, then cut the line."

It will be seen that no attempt was made to haul back the sinker; the principal thing considered was to ascertain the depth without reference to the character of the bottom. The verification of the sounding and the gratification of response from the ocean-bed was lacking to complete the effort, and such work could only be done in good weather with smooth sea and all favoring circumstances.

The cruise lasted eight months, and as the vessel was in port only forty days of that time, it will be readily understood that it was no holiday work; in truth, the tradition runs that the commanding officer gave himself no rest nor would let anybody else rest, and tired out all on board by his extraordinary capacity for hard work and indefatigable way of showing it. The story goes, too, that the chronometers were permitted to run down on one occasion in some mysterious manner, indicative of a desire on the part of somebody to get into port, or wind up the cruise, rather than the chronometers! Lee gravely recorded of this event in his report the remark that "accidents, it is said, will occur in well-regulated families."

The "Dolphin" had made eighty-nine deep casts, but the line had parted in thirty-four of them before bottom was reached, and doubt hung over the results in some of the others; still it was considered that good work had been done, and that the brush of difficulty had, in a measure, been cleared away.

Lieutenant O. H. Berryman now relieved Lee in command of the vessel, and continued the work of exploration in the Atlantic, 1852 and 1853; and though some of the soundings reported were considerably in excess of the actual depths, as has since been demonstrated, the general results, as with Lee, were regarded as the most satisfactory and accurate that had been obtained up to that time. The soundings of both officers developed a ridge about one-third across the Atlantic to the eastward of the West Indies, with a depth of from nineteen hundred to two thousand fathoms over it, which has been called the Dolphin Rise. The soundings of H. M. S. "Challenger" confirmed those of the "Dolphin," in crossing the Rise in 1873. This "Rise" seems to be a continuation in a south-southwesterly direction from the Azores of what is known as the telegraphic plateau between the Azores and the shores of Newfoundland, and discovered by Berryman. While Berry-

man was yet exploring in the "Dolphin" and gaining experience in deep-sea work, one of his countrymen, Mr. Cyrus W. Field, was beginning to interest himself in the subject of ocean telegraphy, and it was to be the good fortune of Berryman to link his name with that of Mr. Field in connection with the first great ocean cable laid.

Mr. Field, who had retired from business with a competency at an age when most men have fairly entered upon the struggle of life, became interested in ocean telegraphy, and in the latter part of 1853, his aid was solicited towards the completion of the submarine line between St. John's and Newfoundland. In the course of his investigations he considered the practicability of establishing telegraphic communication between the two continents, and becoming convinced of its feasibility, obtained the grant of a charter from the legislature of Newfoundland early in 1854, for himself and associates, giving them the exclusive right for fifty years to connect Europe and America by submarine cable *via* Newfoundland.

The needs of the age demanded submarine telegraphic communication, and the demand—given living form and embodiment as it were, by the energetic and prescient action of Mr. Field—quickened and stimulated effort to measure the depths; but not only the depth was required, but the character of the bottom also, for a cable made to rest on bed of ooze, sand, or clay would not do for rocky ridge or pebbly plain.

At this juncture,—1854,—Passed Midshipman John M. Brooke, U.S.N., now Professor Brooke, Military Institute, Lexington, Virginia, came forward with his beautiful and timely invention for leaving the sinker on the bottom and bringing back a specimen of soil from the ocean-bed. If the bottom could be reached and the line freed from the sinker the liability of the line to break in hauling back would be measurably lessened, and the specimen would not only verify the sounding, but declare the character of the bottom.

The invention is so well known that it is needless to describe it further than to say that it consisted of a light iron rod, terminating in a cup at one end, and with movable arms or triggers fitted at the other, the rod passing through a hole, bored or cast, in a cannon-ball of the desired weight. In descending, the cannon-ball hung from the movable arms by means of slings or lanyards, and upheld by the line made fast to the arms above the slings.

The moment bottom was reached the line would slacken, and the weight of the shot pulling down the arms would cause the slings to slip off, releasing the shot and leaving it behind. The cup at the lower end of the rod was "armed" with soap or tallow to make the specimen stick, as non-professional readers may not know; but after awhile Brooke substituted quills, fastened in the cup for that purpose, which answered very well for small specimens.

Other devices had been tried for bringing up specimens from as great depths as it had hitherto been possible to sound with rope; but Brooke's idea of leaving the sinker on the bottom seems to have been the first successful invention towards that end, though the writer has a dim recollection of having read in some numbers of old nautical magazines of experiments of that kind made by French and English officers forty years ago. Maury says, in the second edition of the "Physical Geography of the Sea," published in 1855, "that no one had succeeded in penetrating and bringing up beyond the depth of two or three hundred fathoms below the aqueous covering of the earth any specimens of solid matter for the study of the philosophers;" yet, Sir John Ross, in his exploration of Baffin's Bay, in the year 1818, had invented a machine for bringing up bottom which he called a "deep-sea clamm," and brought up quantities of "soft mud from depths ranging from eight hundred to one thousand and fifty fathoms." Commander C. H. Davis, U.S.N., had also, in 1845, brought up specimens of greenish mud in a Stellwagen cup from a depth of thirteen hundred and fifty fathoms, or more than one and a half statute miles, sounding in the Gulf Stream; and Count Pourtales, of the Coast Survey, had examined and reported upon specimens obtained by Lieutenant T. A. M. Craven, off the coast of North Carolina, from depths of five hundred fathoms.

In this connection it may be mentioned that Lieutenant (now Rear-Admiral) B. F. Sands was not far behind—1857—Brooke in the invention of an ingenious detaching apparatus with cup, which has been preferred by some surveyors to that of Brooke, as noted in some of the Coast Survey reports. The Sands' cup, indeed, with fixed lead, has long been in use both in the Naval Service and Coast Survey.

Berryman first tested Brooke's invention in deep water, but modified the form of the sinker, giving it a conical shape.

Mr. Field and his associates had applied for government aid in surveying a route for the proposed cable, and the steamer "Arctic" was selected by the Navy Department for that purpose. The "Arctic" was the first steam vessel equipped and used for deep-sea work, and a word descriptive of her appointments will not be amiss.

She was fitted with a steam reel, worked by two oscillating cylinders, and the reel held some ten thousand fathoms of stout line. The line in sounding passed through two leading blocks,—one hooked to a pendant from the foremast head, and the other hung from the head of an iron fish-davit, which could be shifted to either bow.

Massey's patent self-registering apparatus seems to have been used as a check on the line for vertical depth. This machine is simply a small metallic screw or propeller set in appropriate frame-work of brass, which, in descending, turns by action of the water, and communicates its motion to the indices of three or more dial-plates, marked in units and tens and hundreds of fathoms, and so on. The dials of the machines furnished

the "Arctic" were improved by Mr. Saxton, of the Coast Survey office, to register twenty-one thousand fathoms before turning back the indices.

Similar machines have been constructed by M. Lecointre, Walker, and Professor Trowbridge, of Yale, but their use, except in the shoaler soundings, has been generally abandoned, as they do not seem to give reliable results in deep water, probably owing to different conditions of friction and pressure at great depths, and their liability to get out of order. Yet, in depths of two thousand fathoms and more, as found by the "Arctic," the Massey machine worked well. Berryman instanced one sounding in two thousand and seventy fathoms, as registered by the apparatus, where only two thousand one hundred and fifty fathoms ran out, and as the Brooke machine brought up a specimen of bottom, there could be no doubt of the value of the sounding.

Berryman started out in the "Arctic" in the summer of 1856, and completed a line of soundings across the Atlantic, from the Banks of Newfoundland to the coast of Ireland, in twenty-two days. He made twenty-four casts in all, and, without a table of the soundings at hand, the writer thinks the greatest depth found was about two thousand seven hundred fathoms. The line or rope used was about an inch in diameter, and the weight of the sinker, cast of lead, was from one hundred to one hundred and fifty pounds, of conical form, rounded off at the base, and with hole one inch in diameter through its length for the Brooke rod. Half a dozen casts would seem to stretch the life out of the rope, and the soundings had sometimes to be repeated, owing to breakage. In good weather a cast in two thousand fathoms generally occupied two hours from the beginning of the errand to the depths until the specimen of bottom was landed on deck.

Notwithstanding this unquestionably good work of the "Arctic," Maury, sitting in his office at the Nautical Observatory, without the slightest experience in deep-sea exploration, disputed the accuracy of the results obtained. It was understood that the survey failed to confirm some pet theory held by Maury; indeed, he had written in his "Physical Geography of the Sea," that "there is at the bottom of this sea, between Cape Race, in Newfoundland, and Cape Clear, in Ireland, a remarkable steppe, which is already known as the telegraphic plateau . . . and the sea is probably nowhere more than ten thousand feet deep;" whereas the water was found to be considerably deeper and the bottom not so regular as had been believed. In fact, the so-called plateau is not so uniform in contour as the bed of the Pacific between San Diego and the Hawaiian Islands, or from Cape Flattery, across the Gulf of Alaska, to a point near the Aleutian chain. But the Superintendent directed some of the Observatory officers to overhaul Berryman's log and report, and some discrepancies in the reckoning as worked out at Washington and at sea, and some omissions in the abstract log, were made the most of. In short, if the writer has not been mis-

informed, this discredit thrown upon Berryman's work was the prime cause of the detail by the British Admiralty of H. M. S. "Cyclops," Lieutenant Dayman, R.N., to make a supplementary survey.

Dayman had pretty much the same apparatus that had been used on board the "Arctic,"—the Massey machine and the Brooke rod, with long conical sinker, but he discarded the quills and fitted a valve in the cup for larger specimen, and substituted wire lanyards or slings for those of rope or cord originally designed by Brooke—manifest improvements. Brooke subsequently modified the rod so as to have only one trigger, insuring more certainty in its working.

The same route was gone over, and the thirty-four casts made substantially agreed with those made by Berryman. The "Cyclops'" deepest cast was in two thousand four hundred and twenty-four fathoms,—fourteen thousand five hundred and forty-four feet,—or almost a mile deeper than Maury's supposed ten thousand feet. Maury was obliged to accept the results of this survey, though he could not understand the "remarkable undulations between Ireland and Newfoundland, and for about one-third the entire distance across." "Here," he continues, "the soundings alternate as deep and shallow with such remarkable regularity as to suggest the inquiry whether this undulating feature be not referable to an accidental error or to personal equation among the operators rather than physical conformation;" and he thought perhaps that "Dayman's sounding-book might make it all right," but goes on with an argument to smooth off the undulations and preserve his famous "steppe." Subsequently, we find him "conjecturing the greatest depth in the Gulf of Mexico to be about one mile,—rather under than over," and advising the officer in command of the Spanish fleet in the West Indies to use the self-registering apparatus devised by him—Maury—for use in the "Taney," as the Gulf waters are not *very deep;* whereas Sigsbee, in the "Blake," has made during the past three years, in the Gulf, two hundred and three soundings in fifteen hundred fathoms and upwards, the greatest depth found being two thousand one hundred and nineteen fathoms, or a mile and a quarter deeper than Maury had supposed!

The writer remembers meeting Berryman at Aspinwall in 1859, and recalls the bitter feeling that officer felt towards Maury for the doubt and discredit blazoned to the world as to the value of the "Arctic's" survey, which had cost him so many anxious hours and so much conscientious hard work.

The next year—1857—Berryman took up in the "Arctic" the exploration of the Gulf Stream, for depth and temperature, which had been previously inaugurated by Superintendent Bache, of the Coast Survey. The thermal observations were made with the Saxton self-registering thermometer, constructed on the principle of the unequal expansion and contraction of two pieces of metal,—silver and platina,

—soldered together, and bent into spiral form, with index attached to mark lowest temperature reached; but the temperatures recorded as the result of those observations were manifestly too low, as has since been amply shown by the more perfect instruments now in use.

Various other cable routes were now surveyed, and officers taxed their ingenuity in devising new forms of self-detaching machines,—notably in the English service, our own officers being pretty well content with the Brooke apparatus.

Commander Dayman sounded, in H. M. S. "Gorgon," from Newfoundland to the British Isles *via* the Azores, and seems to have abandoned the use of detachable leads, making the casts with albacore line, which he cut on reaching bottom, the breaking-strain of which was four hundred and twenty pounds, and the weight of the sinkers one hundred and eighty-eight pounds. Only once was a Stellwagen lead—called a cup-lead in the English service—sent down with a heavier line, bringing up gray ooze from nineteen hundred fathoms. Then followed Sir Leopold McClintock, in H. M. S. "Bull-dog," who, during the summer of 1860, sounded out a new route connecting the coast of Scotland with the Fäeroe Islands and Iceland, and the shores of Greenland and Labrador. Sir Leopold adopted the novel plan of first ascertaining the depth with a stout cod-line and iron sinker of about one hundred weight, which he cut away on getting bottom; then sending down, with appropriate line, a detachable apparatus of rather heavy, clumsy construction, and known as the Bull-dog machine. It was, in fact, a modification of the Ross "clamm." The specimen obtained by this means was large; but the method involved extra expense, time, and labor, and would hardly have answered in crossing the Pacific, where every pound of coal husbanded and every hour of time saved is of prime importance.

Other British officers took part in these surveys in the North Atlantic,—notably Captain Hoskyn, R.N., in H. M. S. "Porcupine," and Navigating Lieutenant Johnson in the steamer "Greenwood." Why no more vessels of our own service were employed on this duty after Berryman's survey the writer has no means of knowing, except that the navy, at that period, had but few steam-vessels suitable for such work; but if seemingly idle in the Atlantic, our officers were actively employed in deep-sea research in the great ocean washing the western shores of the continent.

Brooke, now a Lieutenant, commanding the schooner "Fenimore Cooper," was testing his apparatus satisfactorily in depths of some twenty-nine hundred fathoms in mid North Pacific, or about the region of the Hawaiian Islands, and Commander (now Rear-Admiral) John Rodgers, U.S.N., commanding the U. S. Naval Exploring Expedition, composed of one steamer and three or four sailing craft, in the Asiatic North Pacific and Indian Oceans, Behring's Sea, and the Arctic, was

using both the Brooke machine and an apparatus devised by himself, or constructed under his supervision, somewhat like the Ross "clamm." He obtained large specimens from depths of perhaps one thousand fathoms, but the machine was too heavy for the deeper work of the Pacific. He also constructed for thermal observations a non-conducting cylinder for bringing up specimens of water from different depths, and obtained far more accurate results than could be had with the best thermometers then in use.

Professor Brooke has kindly put at the writer's service his journal of soundings in the "Cooper," and there is so much of interest in it the writer regrets that lack of space will only admit of a few quotations. Following up some experiments of Captain Spratt, R.N., made in the Mediterranean in 1857, of weighing the line when the shot was thought to be on the bottom, and tested by Professor Trowbridge's demonstration of the laws governing the descent of line in water, he deduced a rule of *standard casts*, which led to very accurate and satisfactory results, as is now placed beyond question by the close approximation of the "Cooper's" soundings to those of the "Tuscarora" in the same region of the Pacific. For instance, on approaching Hawaii, Brooke records a cast with specimens in two thousand nine hundred and eleven fathoms, and due north of this position some two hundred and forty miles, the "Tuscarora" found two thousand eight hundred and forty-one fathoms; again, he brings up a specimen about five hundred and sixty miles from the coast of California from a depth of two thousand six hundred fathoms, while due north and due south of this cast, respectively, the "Tuscarora" sounded in two thousand seven hundred and forty-six fathoms and two thousand five hundred and eighty-seven fathoms.

With regard to "feel of line," he says, "The slow descent of the lead at considerable depths, and the probable interference of currents, has led to the expression of a doubt as to the reliability of soundings. It is supposed by some that the instant of touching bottom is not sufficiently indicated; that, however, is not my experience. In most cases . . . the stop has been so well marked, that even the sailors exclaimed with one voice, 'It is on the bottom!'" . . .

The log of a cast made October 5, 1858, is as follows: "This morning calm, with less swell than we have had since leaving San Francisco. As the weather was so favorable I determined to get a cast. In taking from the sounding-rod the quills containing the specimen recovered on the 3d from the depth of three miles, I observed a drop of water in one of them, confined, as it were, by stopples of the very tenacious and adhesive clay of the ocean bottom. It suggested the idea of obtaining a larger quantity in a somewhat similar manner. The base or lower part of the rod used in sounding is tubular, about seven-tenths of an inch in diameter and three inches deep; a small hole in the upper part, covered by a light leather valve, permits the water to flow through as

the rod descends, and thus admits the specimen of the bottom. As the rod is withdrawn the valve closes, all circulation is suspended, and the specimen is preserved intact. The idea which occurred to me was simply to lengthen this tubular portion, and thus to obtain both water and sediment. Some glass tubes procured in San Francisco were adapted to the purpose. I took a piece of one about twelve inches long by one-half an inch in diameter, and wound a band of thin india-rubber about one end, so as to fit it closely in the aperture of the rod, and substituted an india-rubber valve for the leather valve, which was porous. It is said that india-rubber is less compressible than water, and as the recovery of the tube would depend upon that property, since the least compression of the caoutchouc would permit the glass tube to fall from the rod, I preferred to use it. The men were much amused at the idea of sending down a slender glass tube with a shot weighing seventy pounds, nor do I suppose that any one but myself had the slightest hope of its recovery. We succeeded in getting it over the side and fairly under way; the shot reached bottom at two thousand six hundred fathoms, and was detached. When we commenced reeling up the line, a large shark appeared and annoyed me a little, as the marks on the line are attractive baits. There was, too, a possibility of entangling a cuttle-fish or medusa, to which he might take a fancy. However, we frightened him away in making preparations to catch him. At length, to our great gratification, the rod was recovered. Nothing could be more satisfactory than this experiment; the lower end of the glass tube was packed with clay, the valve above, on the side of the rod, was drawn closely in, and the remainder of the tube was occupied by water from the very bottom of the sea. The clay occupied four and seven-tenths inches of the tube, and was packed so closely as to prevent the escape of a single drop; in fact, this clay is so adhesive and tenacious that it adheres to the outside of the rod, notwithstanding its passage of three miles through the water, preserving on its surface the marks made by the shot in slipping off.

"The tube was extracted by the application of gentle force, and I hastened to pour the water into a specific-gravity bottle of twenty-five grammes capacity; to my great regret there was not quite enough to fill it."

Other interesting details of Brooke's experience could be given from his journal did not lack of space forbid, but enough has been shown to demonstrate the fact that until the invention of the Thomson machine, no one had more successfully grappled with the problem of deep-sea sounding than our countryman and former fellow-seaman, John M. Brooke.

But now the unfortunate civil war intervened, and interrupted with rude and blighting hand these beneficent researches, which had for their aim the general instruction and weal of mankind, and arrayed life-long companions, brothers in arms under the flag, one against the

other in the stern and dire realities of the conflict. In foreign services too, there seems to have been a letting-up of work in deep water about this time,—1861,—and perhaps the Coast Survey was the first to renew operations in running a line of soundings across the Straits of Florida, between Key West and Havana, in the spring of 1866. Mr. Henry Mitchell, Assistant Coast Survey, had charge of the work, and the steamer "Corwin," Acting Master Platt commanding, was put under his orders for that purpose. Mr. Mitchell says, in his report, that "several years had elapsed since the Coast Survey had made deep-sea soundings, and therefore no suitable leads and lines remained for this new call, and he was obliged to prepare an entire outfit." He used two sizes of line,—the smaller, ¾-inch in circumference, of Italian hemp, and the larger, 1-inch rope, of both Italian and Russian hemp.

For leads he had both the Brooke apparatus, improved by Berryman, and the Sands cup and detacher; the sinkers weighed about ninety-six pounds. The line was permitted to run freely, and the Walker, Massey, and Trowbridge machines registered the depth; the Walker seems to have been given the preference for accuracy. The Berryman-Brooke was reported as being the best for specimen, but the Sands apparatus the most certain as a detacher.

The greatest depth recorded was eight hundred and fifty-three fathoms, but the "Blake," going over the same ground in 1877 with wire, generally found nine hundred fathoms, and in one cast nine hundred and fifty-one fathoms, showing that the registering machines were considerably in error. The line was reeled in by hand, and Mitchell reports that "at the last cast made, with fourteen hundred fathoms of the large Italian line out, twenty-two men failed for ten minutes to start it, and the 'Corwin' swung to it as if at anchor by the stern." The Coast Survey orders these things differently now, and Lieutenant-Commander Sigsbee would have been very restive under such a showing; in fact, he wouldn't have known what to make of it; and what wonder, since in the "Blake," with a Thomson machine, modified and improved by himself, it was his habit, when once fairly at work, to get casts in two thousand fathoms and upwards at distances of every six miles, working continuously day and night, without fretting or tiring his crew, and having the comfortable feeling that the results were as near absolute accuracy as possible to make them.

In 1868, Commander Chimmo, R.N., of H. M. S. "Gannet," made a number of soundings—some in two thousand seven hundred fathoms—on the homeward run from the West Indies, using the Brooke machine; but the most important and satisfactory exploration of the depths that year was made by Captain Shortland, R.N., in H. M. S. "Hydra," who was ordered by the Admiralty to survey a cable route from Aden across the Arabian Sea to Bombay. Captain Shortland seems to have had a genius for deep-sea work, and his ship was undoubtedly better

equipped for the purpose than any vessel hitherto engaged in such service. The modification of the Brooke apparatus, known as the "Hydra" machine, was constructed under the eye of Captain Shortland, and, as further improved by Staff-Commander Baillie, R.N., is now the favorite machine in the British service. One admirable feature of the "Hydra" is that the sinker consists of several iron disks, of an average weight of one hundred pounds each, "toothed and notched," so as to form a compact mass when put together; the obvious advantage is that the weight can be increased or diminished at pleasure, according as the depth makes one or the other desirable.

The rod passes through the sinker, as in the Brooke, and consists of a brass tube, which unscrews into four chambers,—the upper one for water,—the lower chamber for specimen being fitted with butterfly-valve. The slings, instead of resting on a movable arm, depend from a stud projecting from the upper end of the rod, and an arched steel spring, with a slit directly over the stud, is fastened to the rod longitudinally, the ends having play so that the spring can be readily pressed inward. When the sinker is suspended the spring is pressed in, and from the stud, now outside the spring, the slings are hung, the weight holding the spring back; the vibration of the line, however, sometimes in descending would throw off the sinker, as Lieutenant Johnson, R.N., reported in running a fresh line of soundings between the Banks of Newfoundland and England, in 1869. Commander Baillie's improvement does away with the stud and spring, and substitutes a sliding "catch." The bight, or loop, as landsmen would call it, of the slings passes over it, and when bottom is struck the "catch" drops over a conical end, or, as the lively author of the "Log-Letters from the 'Challenger'" puts it, "is elbowed off," and the weight is released. Captain Shortland seems to have made the first use of the "accumulator" to relieve sudden strain on the line in a seaway, and to indicate roughly the amount of strain as the line runs out. This consists of two score or more of rubber springs, rove through stout wooden disks, placed two or three feet apart, with appropriate fastenings. The lower end of the accumulator is fastened to a short pendant hooked into an eyebolt in the deck, and to the upper end is spliced a longer pendant, passing through a fair leader on the sounding derrick, and having a block turned in at its other end, through which the sounding line is rove. The upper pendant is fitted long enough to permit the accumulator to stretch more than double its length, but arranged to keep it within breaking limits.

The deepest water found in the Arabian Sea was twenty-one hundred and sixty fathoms; but the "Hydra" sounded in the region of the South Atlantic between the Cape of Good Hope and St. Helena on her homeward voyage, and got two thousand eight hundred and thirty fathoms, using a 378-pound weight for sinker; at two thousand fathoms,

a 200-pound lead was considered sufficient. Captain Shortland's report embodied much valuable information, from which the writer derived a good deal of instruction, and which he is glad to acknowledge in this way.

In the summer of 1869, the Swedish sailing corvette "Josephine" came into Boston from a sounding and dredging cruise in the North Atlantic. She reported finding depths of three thousand fathoms and upward, and used a curious detaching apparatus,—the invention of the navigating officer on board. It was a light iron frame-work contrivance, in which a round shot for sinker was held as in a cradle, and underneath hung a small bag made of bunting. As the sinker was released on reaching bottom two sharp-edged jaws came together and scooped into the bag the specimen, and the bag closed automatically. The apparatus was said to work well, and doubtless a pattern of it, which the Swedish captain gave the commandant, Rear-Admiral John Rodgers, is still in the navigation office at that station.

To go back to 1868: the little steamer "Lightning" left Pembroke, England, on the 4th of August, that year, on a sounding and dredging cruise in that region of the North Atlantic embraced within a circle passing through the Fäeroe and Shetland Islands and the northwest coast of the Hebrides; and if she had not "Cæsar and his fortunes" on board, she carried those distinguished scientists, Dr. William Carpenter and Professor Wyville Thomson, as well as the inception of the best-equipped and grandest expedition for scientific research that has yet sailed under any flag. Professor (now Sir Wyville) Thomson had long felt that the "land of promise for the naturalist was the bottom of the sea," and through the exertions of himself and his friend, Dr. Carpenter, one of the vice-presidents of the Royal Society, the British Admiralty were persuaded to let them have one of her Majesty's vessels for a summer cruise.

The "Lightning" enjoyed the distinction of being about the oldest paddle steamer in her Majesty's service, and, as may be imagined, was very much of a tub,—like some of those pictured in *Punch* in Sir John Pakington's time. She was, indeed, a battered old craft, weather-worn and leaky, and on more than one occasion came near giving Sir Wyville and his coadjutor more knowledge of the depths than would have been agreeable.

Whether the Admiralty, which as a body has not been regarded as particularly enthusiastic in the matter of putting naval means at the disposal of civilians, had any further designs upon the well-being of the eminent scientists, or wished to dampen their ardor, it is perhaps charitable not to indulge an opinion; but one can fancy the grim smile that must have lighted up the faces of the sea members of the board when they read Sir Wyville's naïve confession that "they had not good times in the 'Lightning';" that in the "deplorable weather"

encountered she was "scarcely seaworthy"; and that "they were in considerable discomfort nearly the whole of the six weeks they were on board."

Still, the cruise was so successful and interesting that they were emboldened to ask for a larger and better vessel for the next season; they had dredged in six hundred fathoms, a hitherto unheard-of feat, finding animal life abundant at that depth and several new forms of interest to naturalists. Before putting over the dredge it is first necessary to ascertain the depths, and for this purpose the "Lightning" made use of the "Fitzgerald machine," an apparatus with detachable sinker, devised for large specimen, but of heavy, unwieldy construction, and uncertain in its working, as the writer knows from personal experience.

The next year—1869—the surveying vessel "Porcupine," Captain Calver, R.N., was placed at their disposal. The vessel was staunch and snug and well equipped, and her commander an accomplished hydrographer. He profited by the experience of Captain Shortland in deep-sea work, and modeled his sounding fittings after those of the "Hydra,"—using the "Hydra" detaching machine for specimen "slip-board" in letting go,—and donkey-engine for reeling in, together with such other appliances for dredging and trawling as the purposes of the expedition suggested and his own genius supplied. Mr. Gwyn Jeffreys, F.R.S., was now associated with Dr. Carpenter and Sir Wyville Thomson, and they took turns in the scientific direction of the work of the vessel, which extended over a period of two years,—1869-1870,—going over the same ground occupied by the "Lightning," and extending their operations to the waters off the coasts of Great Britain and France, the Bay of Biscay, and the Mediterranean.

The great achievement of these cruises was the successful dredging in two thousand four hundred and thirty-five fathoms, "in the Bay of Biscay," July 22, 1869; an unparalleled feat up to that time.

The preliminary sounding is described at length in Sir Wyville's "Depths of the Sea," the most fascinating and instructive work on deep-sea research ever written. The sounding instrument was the "Hydra," weighted with three hundred and thirty-six pounds. The "steam-reel, commanded by a brake, held about four thousand fathoms of medium No. 2 line, of the best Italian hemp, weighing twelve and a half pounds to the fathom; with circumference of 0.8 inch, and breaking-strain—dry—of fourteen hundred and two pounds. The line was run off by hand from the reel and given to the weight as fast as it would take it, so there might not be the slightest check or strain."—No thought of a dynamometer here it will be perceived.—The conditions of sea and weather were unusually favorable, and the cast made with great care.

The lead was thirty-three minutes and thirty-five seconds in going down, and two hours two minutes and thirty-five seconds in coming back. Sir Wyville gives the table of descent, but says "the timing was only

valuable as corroborating other evidence of the accuracy of the soundings, for even at this great depth—nearly three miles—the shock of the arrest of the weight at the bottom was distinctly perceptible to the commander, who passed the line through his hand during the descent." Possibly though in face of almost overwhelming experience to the contrary, yet early in the "Tuscarora's" expedition, sounding with albacore line and heavy sinker, Lieutenant-Commander Jewell said he felt the shock of striking at eighteen hundred fathoms. "This," continues the author, "was probably the deepest sounding up to this time which was perfectly reliable." Sir Wyville here hardly does justice to the work of his countryman, Captain Shortland, of the "Hydra," whose devices they were using, and whose soundings in the Atlantic, made with great skill, were considerably deeper; nor to the work of Brooke of our own service, in the Pacific, shown to have been entirely reliable in depths of twenty-nine hundred fathoms. And if Captain Calver felt the shock of striking bottom with this stout line, then there can be no question but that much of the "Dolphin's" work under Lee and Berryman, with twine and relatively heavier sinker, was perfectly accurate.

These voyages of the "Porcupine" yielded such splendid results to the delighted and indefatigable explorers, that they determined to seek still further favor from her Majesty's Lords Commissioners of the Admiralty, which resulted in the designation and equipment of H. M. S. "Challenger" for a four years' cruise round the world, for the further prosecution of these interesting researches in the great domain of the deep; but more of this anon.

In 1870 and '71, Commander (now Captain) John Irwin, U.S.N., was employed in the U. S. steamer "Yantic" in making cable soundings in the waters about the West Indies and the Caribbean Sea, and, so far as the writer can learn, the sounding outfit was rather primitive for the age; non-detachable leads and self-registering machines were resorted to, and the line was hauled in by hand. This was tedious work, and a cast in two thousand five hundred fathoms would generally occupy a whole watch,—and sometimes the sounding would prove to be so unsatisfactory that it would have to be repeated. It is due to Commander Irwin to say, that his instructions were perhaps issued under peculiar circumstances, and that he had no opportunity to get the appliances which should have been furnished the vessel.

About this time the Coast Survey steamer "Hassler" left Boston for the Pacific, having the late Professor Agassiz on board as passenger. It was understood that she was equipped for deep-sea work, and much was expected of her, especially as Professor Agassiz was known to be earnestly interested in such research, but not much work in that direction seems to have been accomplished; the lines furnished were either originally defective or rotted on board ship, and often broke in the attempts to sound. The vessel had a steam-reel, but she had not the

Brooke machine nor any substitute for it, if the writer's memory serves him right, except something like the common can-hooks used by stevedores; and, in short, her fittings did not compare at all favorably with the equipments of H. M. ships "Hydra" and "Porcupine." Perhaps the Coast Survey had not fairly recovered from the demoralizing effects of the war. Be that as it may, the vessels of that service equipped like the "Blake," are now undoubtedly more perfect in their appointments for deep-sea work in all its forms—sounding, trawling, and dredging—than the surveying vessels of any foreign service, due to the comprehensive plans and methods, and liberal and energetic management of the new superintendent, seconded by the inventive genius and untiring efforts of Lieutenant-Commander Sigsbee, U.S.N., of the "Blake."

From time to time various automatic machines have been devised for finding the depth independently of line, and the writer thinks the "Hassler" had some such contrivance on board, the invention of Professor Trowbridge; and in 1874 there appeared in the columns of the *Scientific American* the drawing and descriptive text of an apparatus, the invention of a Captain Hotchkiss, of Connecticut, that was to travel down to the bottom, deposit the sinker, and then rise to the surface, all of its own volition, showing a red flag to the patient waiters in a boat, with depth duly registered, and bearing a specimen of bottom soil. No thought seems to have been given to the freaks of submarine currents, or to the inevitable tendency of boats and ships to drift, or to the great difficulty of making out small objects in the water except in a dead calm; and in truth, the machine so beautiful on paper would have made a poor showing at sea.

From this review it will be seen that, though our Naval Service may justly claim the first successful efforts to measure great depths and bring back specimens of bottom soil to delight the eyes of the persistent seekers, and lend fresh interest to the revelations of the microscope, yet, owing in a great measure to the sterner demands of war, English officers had had most opportunity to profit by that experience and perfect appliances, and, with the exception of Berryman's exploration, had been employed in the surveys of all the great cable routes.

So matters stood until Sir William Thomson brought forward the machine destined to revolutionize deep-sea work, and which it fell to the lot of our service to put to the test almost before its inventor could perfect its working or demonstrate its success under all conditions and in all depths. Sir William proceeded on the principle that "the art of deep-sea sounding is to put such a resistance on the reel as shall secure that at the moment the weight reaches the bottom the reel will stop." Here was the pith of the matter, the solution in a nut-shell.

Captain P. F. Shortland, R.N., in his report of the "Sounding Voyage of H. M. S. 'Hydra,' 1868," had enunciated the idea that "an accumulator should be fitted so as to show accurately at any instant the

strain on the line, which should never be permitted to run free, but be kept at a tension depending upon the circumstances of the sounding;" but in all the deep-sea work done up to 1872, the line had not only been allowed to run freely, except on board the "Hydra" and perhaps in the experiments of the "Taney," but had been given line by the hand, and no thought had been given such an instrument as a dynamometer proper. Captain Shortland proceeds to say further, that "when the line has run out near the expected depth, the times of each fifty fathoms' mark passing out should be carefully noted, and after the weight has struck the bottom two more of those marks should be permitted to pass before altering the condition of the reel, and the times noted. If, however, the line stops soon after the weight strikes the bottom, which it will do under favorable circumstances, it is obvious that the marks will not pass outward, but, in this case, the length of the line at the instant of striking will be given without using the time-intervals, which would otherwise be essential to its determination." But this time-interval precaution does not enter into the Thomson method at all; the reel is to stop, and does stop the moment bottom is struck; and by the "moment" is meant, as the inventor expresses it, "within one second of time."

When Sir William first conceived the idea of his machine the writer has no means of knowing, but he had long been interested in the manufacture and the laying of submarine cables, and had made some notable inventions in perfecting the instruments and appliances of ocean telegraphy. His first trial with the apparatus is perhaps best told in his own words. He says, "On the 29th of June, 1872, I sounded from the 'Lalla Rookh' schooner-yacht, in the Bay of Biscay, with a lead weight of thirty pounds, hung by nineteen fathoms of cod-line from another lead weight of four pounds, attached to one end of a three-mile coil, made up of ends of piano-forte wire spliced together and wound on a light wheel, about a fathom in circumference, made of tinned iron plate. The weight was allowed to run directly from the sounding-wheel into the sea, and a resistance exceeding the weight in water of the length of the wire, actually submerged at each instant, was applied tangentially to the circumference of the wheel by the friction of a cord wound round a groove in the circumference, and kept suitably tightened by a weight. My position at the time was considerably nearer the north coast of Spain, from a point where the chart shows a depth of two thousand six hundred fathoms, the greatest depth previously marked on the charts of the Bay of Biscay.

"When from two thousand fathoms to two thousand five hundred fathoms were running off the wheel, I began to have some misgivings as to the accuracy of my estimations of weight and application of resistance to the sounding-wheel. But, after a minute or two more, during which I was feeling more and more anxious, the wheel suddenly stopped revolving, as I had expected it to do a good deal sooner. The impression on

the men engaged was that something had broken, and nobody on board except myself had, I believe, the slightest faith that the bottom had been reached. The wire was then hauled up by four or five men pulling on an endless rope round a groove on one side of the wheel's circumference. After about one thousand fathoms of wire had been got in, the wheel began to show signs of distress. I then perceived for the first time (and I felt much ashamed that I had not perceived it sooner) that every turn of wire under a pull of fifty pounds must press the wheel on the two sides of any diameter with opposing force of one hundred pounds, and that, therefore, two thousand two hundred and forty turns, with an average pull on the wire of fifty pounds, must press the wheel together with a force of one hundred tons, or else something must give way. In fact, the wheel did give way, and its yielding went on to such an extent that when five hundred fathoms of wire were still out, the endless cord which had been used for hauling would no longer work on its groove. The remaining five hundred fathoms and the thirty-pound sinker were got in with difficulty by one man working at a time in an awkward position over the vessel's side, turning the wheel slowly round by a handle. I was in the greatest anxiety, expecting at every moment to see the wheel so badly out of shape that it would be impossible to carry it round in its frame, and I half expected to see it collapse altogether, and cause a break of the wire. Neither accident happened, and, to our great relief, the end of the wire came above water, when instantly the nineteen fathoms of cod-line were taken in hand, and the thirty-pound sinker hauled on board. I scarcely think any one but myself believed the bottom to have been reached until the brass tube with valve was unscrewed from the sinker, and showed an abundant specimen of soft gray ooze. The length of wire and cod-line which had been paid out was within a few fathoms of being exactly two thousand seven hundred fathoms. The wire was so nearly vertical that the whole length of line out cannot have exceeded the true depth by more than a few fathoms. That one trial was quite enough to show that the difficulties which had seemed to make the idea of sounding by wire a mere impracticable piece of theory have been altogether got over. The great merit of wire, compared with rope, is the smallness of the area and the smoothness of the surface which the wire presents in contrast with the greatness of the surface and its roughness when rope with a comparable degree of strength is used. The wire that I have found suitable is piano-forte wire of the Birmingham gauge, No. 22. It weighs about fourteen and a half pounds, in air, to one nautical mile, and bears from two hundred and thirty to two hundred and forty pounds without breaking."

The "Challenger" was fitting out for her famous voyage round the globe at the time this experiment was made, and Sir William hastened to lay the result before the Admiralty and suggest the use of the ap-

paratus in the expedition. That conservative body, however, declined its use "until the machine could be perfected," and Captain (now Sir George) Nares seems to have acquiesced in that decision. The vessel was nevertheless supplied with the original machine and wire, and Commander Maclear, R.N., the executive officer of the "Challenger," stated before a meeting of the British United Service Institution, Feb. 4, 1878, that "Sir William had been good enough to show it and explain the working of it to him at the meeting of the British Association, at Brighton, in 1872, before they sailed." The inventor, too, was one of the committee of the Royal Society invited by the Admiralty "to make any suggestions with regard to the composition of the civilian staff, or any other scientific matters connected with the expedition, upon which they desired to offer an opinion"; and it would seem that as a matter of courtesy due so distinguished a member of the committee, a trial of the apparatus offered by him would have been made during the long and eventful cruise of the ship. As it was, the vessel proceeded on her momentous and unmatched errand, equipped with every instrument and appliance that art and science, mechanical skill, and seaman's experience could devise or suggest, and yet discarded the use of the incomparable machine that would not only have rendered her work more accurate, but would have lessened the labors of the cruise more than one-half; especially if wire rope had been used for dredging, which the beautiful working of the wire in sounding would naturally have suggested! Commander Maclear, at the meeting of the United Service Institution to which reference has already been made, said, "One great thing that determined we should not use it on board was that we required in the 'Challenger' not only to find out the depth, but also to send down water-bottles, several thermometers, pressure-gauges, and other instruments; . . . that there is one great fault with wire used as a sounding line, that is, if it takes a kink anywhere, catches under the keel, or gets a nip, it parts instantly; and Captain Nares, after consideration, determined that it was far too great a risk to run with the instruments to chance the loss of so many of them by a nip of the wire. . . . I would also mention the difficulty of attaching thermometers to the wire at different depths." True, the wire will kink and nip or catch under the keel and break, if carelessly handled, or the sinker does not detach, or the ship become unmanageable in a strong current, or is overtaken by a heavy squall, but the use of rope did not save the "Challenger" from such mishaps and losses once in a while; and the officers of the "Tuscarora," "Essex," and "Blake" sent down water-bottles, thermometers, and other instruments, and never found any difficulty in attaching them to the wire, and in bringing them back, as a general thing, in safety. The writer remembers one Miller-Casella thermometer that he never could get rid of in a legitimate way; the instrument registered correctly, but the index needle was so hard to

move that it sometimes required a couple of hours' coaxing with the magnets to get it into place, preparatory for the next journey to the depths, from which it would always return in safety in the most provoking manner.

Commander "Joe" Miller, U.S.N., while running a line of soundings from Honolulu to Brisbane, Australia, showed his faith in the wire by sending a bottle of champagne down to a depth of three thousand and eighty fathoms, whence it came back uninjured. The seawater had not penetrated the cork for all the palate could detect, and the wine had the temperature of 40° on pouring it out. This occurred in the tropics, and the enjoyment produced was doubtless proportionate to the risk. Here is a hint for mid-ocean dinner-parties in tropical latitudes; as the guests gather round the table the champagne can be sent down fifteen hundred fathoms or so by means of the wire, and be brought back delightfully cool, almost before the soup is removed. The seaman, if he did but know it, carries his own refrigerator with him!

If the Lords Commissioners of the Admiralty had not looked upon the wire machine favorably, it was far otherwise with our naval administration. Commodore (now Rear-Admiral) Daniel Ammen, himself an inventor, with a mechanical and philosophical turn of mind, and broad views with regard to the introduction of new ideas and the testing of new inventions of practical promise, was chief of the Bureau of Navigation; and as soon as he had heard of the successful demonstration in the Bay of Biscay, he put his Bureau in communication with Sir William Thomson, and ordered one or more of the machines for trial. Hardly any one in the country but himself had much faith in the apparatus, owing, perhaps, to the failures in the "Taney"; but he believed in it from the first, as both his official and personal letters amply attest. It was first contemplated to use the machine in making soundings from New York to Bermuda, and the "Juniata," Commander Braine, was fitted out for that purpose in the winter and spring of 1872 and '73; but when about to start on the survey the project was abandoned for some reason not known to the writer, and all her fittings were transferred to the "Tuscarora," at San Francisco.

GEO. E. BELKNAP,
Captain U.S.N.

(Will be concluded in No. 3.)

SOME EXPERIENCES WITH THE CHEYENNES.

THE latest blossoming of our Indian policy, as exemplified in the case of "Dull Knife's" band of the Northern Cheyennes, has attracted wide-spread attention, and not a little adverse comment. It exhibits, in epitome, the baneful consequences that must ever attend the working of a system of divided responsibility in the conduct of Indian affairs. Not being in possession of sufficiently authentic and detailed information on which to base an intelligent judgment, I shall not attempt to impute blame to either the civil or military officials connected with this affair; indeed, had I such information, I should have neither the disposition nor the right to criticise or find fault, my purpose and only legitimate province in this paper being to jot down for the entertainment of the readers of THE UNITED SERVICE some experiences of my own with the Northern Cheyennes in times gone by, when Dame Fortune was more benign to them than she has proven of late. I cannot, in passing, however, restrain expression to the thought, that has doubtless occurred to many of us, of how great the pity is that gallant soldiers, the peers of the best humanitarians in all the refinement and susceptibilities that belong to gentlemen, should be compelled by the stern requirements of duty to turn their arms, under such circumstances as attend this occurrence, against a people whose wild love of liberty and home could make them do, and dare, and die so bravely as have these Cheyennes.

In the spring of 1871 the Fourteenth Infantry, of which I was then the lieutenant-colonel, was ordered to Forts Laramie and Fetterman, in the Territory of Wyoming; the regimental headquarters, with six companies, going to the former post, and I, with the remaining four companies, to the latter. Fort Fetterman, named for the gallant but unfortunate officer who, with his entire command, was slaughtered by the Sioux Indians, near Fort Phil Kearney, in 1866, is situated at the junction of La Prêle Creek and the North Platte River, and was, at the time of which I speak, the extreme outpost of the Platte River region. Fort Laramie was eighty miles distant, in a southeasterly direction, but, for all that, was our nearest neighbor; and Medicine Bow Station, on the Union Pacific Railroad, ninety miles to the south-

west, was the nearest point to us touched by that great artery of travel and commerce. We had a mail once a week, which we got by sending a party to Horseshoe Creek, half-way between us and Fort Laramie, where it was met by a similar party from the latter post, between whom our outgoing and incoming mails were exchanged. We had, besides, telegraphic connection with Fort Laramie, and with department headquarters at Omaha.

At this time we were, nominally, at peace with all of the Northwestern tribes. This peace was not exactly of the kind that politicians habitually denominate "profound," but was rather a one-sided affair, in which we were to presume all Indians to be peacefully inclined until the contrary were shown; a principle that did not operate beneficently as to parties that might meet the copper-colored gentry at the moment their savagery—emotional, like the insanity of the modern murderer—got the better of their plighted faith.

The situation of Fort Fetterman made it a convenient house of call for roving bands of the Ogallalah Sioux, the Northern Arrapahoes, and the Northern Cheyennes; the two latter of which tribes, although claimed by Red Cloud to belong to his jurisdiction, and therefore appurtenant to his agency, repudiating such claim, had been allowed by the government to receive their supplies at Fetterman, and the post had therefore become practically their agency, and its commanding officer *ex officio* their agent.

I had been in command at Fetterman but a short time, when one day runners came in bringing intelligence that "Little Wolf," one of the three head-men of the Cheyennes—the other two being "Turkey Legs" and "Dull Knife"—would arrive the next day with the larger part of the tribe, who were returning from their great autumn hunt in the Powder River country. And the next day, about ten o'clock in the forenoon, the sentinel whose beat commanded a view up the valley of the Platte reported the approach of Indians. Although still some miles away, we could easily, by aid of field-glasses, separate what to the unaided eye seemed only a dark moving mass into its constituents of warriors, squaws, children, ponies, and dogs. The column came on, moving slowly, but with such order and precision as gave token of skilled leadership and soldierly discipline. Arrived near the post, a halt was called, and immediate dispositions made for camping, the labor involved falling, as all labor does among savages, upon the women. The unloading of the ponies and their picketing out, the erection of the "tepees," the carrying in and stowing away of the bundles of robes, bags of pemmican, strings of dried meat, and the few utensils employed in culinary operations, that constitute the *impedimenta* of Indian marching, all devolve upon the squaw. Leaving the women to their labors, Little Wolf, accompanied by a select few of his warriors, came up to the post for a talk with the commanding officer, stopping on his

way at the log cabin just outside the fort, where lived our guide and interpreter, Joe Merival, "Old Joe," as he was popularly called, whose services were indispensable on all occasions of council or talk. Joe was a grizzled Mexican, whose whole life had been spent among the Indians, formerly as a trapper, but for many years in the capacity he held at Fetterman, of guide and interpreter. Joe was a character, and his dialect was something all his own. Indeed, until use made it familiar and to some degree intelligible, his speech needed interpreting nearly as much as that of the Indians themselves. One of Joe's dialectic peculiarities was the excision or clipping off of the last syllables of words, as though he disapproved of redundancy, and boldly rejected what he regarded as surplusage in language. For example, "Bible" with Joe became "bibe," and "you ain't the Bibe" was Joe's mode of telling one with whom he differed in opinion that he was not infallible. Joe was also indifferent to gender, and habitually spoke of woman—"gooman" he called her—as "he." On one occasion he was telling a party of officers about a game of *monte* he once saw in Mexico, and was illustrating how deftly the dealer cheated the players. "But, Joe," said one of the officers, "I should have thought they would have knifed him." "Oh, no, no," said Joe; "*he* was a gooman." Well, Little Wolf having secured Joe's services, came to my office, and filing in with his dusky aids, each as they entered shaking my hand and ejaculating "how," he took a proffered chair, while the others ranged themselves around the walls of the room, squatting or sitting on the floor. The Indian in council is the most deliberate of mortals, and beyond uttering his "how" on entering—and that is not invariable—not a word will he speak until the pipe has been produced, slowly filled with kinikinnik, passed to the end man at the right, by him lighted, devotionally tendered, first, by a downward gesture, to Mother Earth, and then, by an upward one, to the Great Spirit above, then a whiff or two taken, and the pipe handed to the next man towards the left, who, repeating the proceedings of the first, hands it to his left-side neighbor, and so on till its circuit of the assemblage is completed. At least once, often twice or three times, the pipe makes its rounds before the talking begins. Then the chief, or head-man, of the party rises, offers his hand to the person he is about to address, says "how," and begins his speech. On this occasion, Little Wolf, after telling me that he was glad to see me, and "that his heart was good towards me," went on to say that they had had a prosperous hunt in the fall, and had procured a large supply of skins, which they had dressed, and were now anxious to trade for the various articles of use and ornament that suit the Indian taste. Besides our regular post trader, there had gathered near the post a number of others provided with Indian goods, in anticipation of this coming in of the Cheyennes, and Little Wolf wanted me to say what rules should be observed in dealing with them. He informed me that he had "made

soldiers,"—equivalent to posting sentinels,—and that none but those I saw with him would be permitted to leave their village, or camp, till he had my permission to open trade. Having listened to what I had to say in reply, and receiving permission to make the best bargains he could, and with whom he chose, he and his companions took their departure, and spent the rest of the day in stalking solemnly about from one trader's camp to another, getting from each of the competing dealers a "feast,"consisting mainly of coffee and crackers, and receiving at the same time proposals for their robes and other peltry. The next day Little Wolf gave his people loose rein, and they were soon everywhere about the post. Many of the women and children, more curious than avaricious, dropping out of the crowds that pressed around the counters of the post trader, would come up to the officers' quarters and hang for hours about the windows, peering in, and frequently flattening their noses against the panes to get a more satisfactory view of our interior life, which seemed to possess for them irresistible attraction. Most of our ladies were sufficiently familiar with Indians not to be seriously alarmed by their presence, but to the more timid and nervous among them the sudden apparition of an aged crone, whose hand, no doubt, had often brained or scalped the white victim of Indian savagery, would be far from exhilarating. Others of the Indian women, however, were not a whit behind their sisters of the pale-face in their propensity for "shopping," and would stand hour after hour, ranged two and three deep, along the counters in the post trader's store-house, feasting their eyes on the bright beads and parti-colored calicoes and flannels with which his shelves were loaded, producing from time to time, for the purposes of barter, a buffalo tongue, dried and cured, or a dressed skin of some of the smaller objects of the chase, which, up to that moment, had been carefully hidden somewhere about their persons. Some of them on this occasion perpetrated a fraud on the post trader that for a time gave promise of largely increasing their personal estate at his expense. In the rush of business, which he was taking at its flood, he and his assistants had no time to make any orderly disposition of the wares he was receiving, and, as fast as gathered in, the buffalo tongues and peltry were tossed under the counters, discovering which, some of the Indian women managed quietly to detach one of the boards forming the front of the counter, and, reaching in, would abstract the wares already once paid for and unblushingly "swap" them again.

From this time forth, during nearly my whole stay at Fetterman, I had a good deal of experience with the Cheyennes. Every five days, when they were in the neighborhood, they came in to receive their rations, the issuing of which nearly always had to be prefaced by a council or talk, the object of which, however it might at first be masked by a pretence of other business, generally proved to be a demand for an increased supply of subsistence stores. For a long time they insisted

that I was not giving them credit for the number of people they had, and, to prove it, they would bring to the councils a bundle of small sticks of uniform size and length, which constituted their census, each stick counting for a person, and they thought it very hard that I would not accept this return as final and conclusive. I invariably told them that whenever they would submit to be counted I would increase the number of their rations if my enumeration proved their claim to be well founded; but, until such time, I would adhere to the existing practice of estimating their number from the number of "tepees" or lodges constituting their village. In common, I believe, with Indians generally, they were averse to being counted, whether because of some superstition or because their actual number being once ascertained it would not be so easy to magnify it on occasion, I do not know. However, they finally yielded, and at an appointed time they formed a great circle in a grassy spot just across the Platte, and, accompanied by my adjutant and quartermaster and the interpreter, I rode over, and, passing slowly around inside the circle, made my count, while each of my companions made his, and when we were through we compared and verified our several enumerations. The result was that they were found to have a considerably greater number than I had been issuing to. On this occasion the whole Northern Cheyenne tribe were present, with the exception of one small band whose numbers were pretty accurately known, and as this was the first time that an actual enumeration of them had been successfully attempted, the information obtained was not without value.

Of the three head-men of the Cheyennes, Dull Knife was, I think, greatly the superior. Tall and lithe in form, he had the face of a statesman or church dignitary of the grave and ascetic type. His manner of speech was earnest and dignified, and his whole bearing was that of a leader weighted with the cares of state. Little Wolf had a less imposing presence, but looked more the soldier than the statesman. Turkey Legs looked his character, which was a very bad one. His appearance was mean and forbidding, and bespoke the very incarnation of treachery and cruelty. The ascetic-looking Dull Knife was, however, not superior to a fondness for sweets. Somebody about the post had given him once a can of preserved pine-apple, and this he had found so toothsome that he resolved if possible to have it included in the issue of rations made to him. Accordingly, the next issue day, he told Joe that he wanted him to ask the colonel for some pine-apple. Joe told him that it was useless to ask for it, as he would only be refused. "You do as I tell you," said Dull Knife. "You ask the colonel for it, and *accident* (Joe, for 'accidentally') he may be in good humor, and may give it to us."

Turkey Legs distinguished himself on one occasion at Fetterman by a wonderfully successful fishing exploit that he and his people accomplished with a seine belonging to one of the companies at the post,

which had been loaned him on condition that all the pickerel he should take with it should go to the company, he retaining such other of the finny denizens of the Platte as might be captured. Taking the seine, the whole band—men, women, and children—proceeded to the river, and selecting a spot where the channel was much narrowed by a projection of the opposite shore, the men, wading in, stretched the seine across the upper end of the narrowed part, while the women and children, mounted on their ponies, formed a line across its lower end, and, closing in upon the party with the seine with a great noise of shouts and splashing of water, they drove the fish into the seine as it was slowly swept shoreward, the *net* result being a take of nine hundred fish, of which the pickerel, the part going to the company, filled a hand-cart to overflowing. Much elated at their success, they were about to repeat the experiment, when Joe, fearful that they would depopulate the stream, forbade further attempt in that direction.

The only hostile act of which any portion of the Cheyennes was guilty during the time the tribe was under my supervision—at least the only one committed anywhere in the region over which the protection afforded by Fort Fetterman could be regarded as extending—was an attack, made by a small party of them, on a quartermaster's wagon-train at La Bontée Creek, twenty-two miles from the post, on the Laramie road, in the month of May, 1872; and the subsequent killing of Sergeant Mularkey of my command, who, being in charge of the mail party *en route* for Horseshoe Creek the same day that the wagon-train was attacked, had incautiously ridden ahead of his party, and, coming upon the Indians just after they had been repulsed in their attack upon the train, fell a victim to their rage and disappointment. In this affair the Indians succeeded in killing the sergeant, taking the mule he rode, and escaping into the hills before his party could come up, the first intimation the latter had of the presence of the hostiles being their coming upon the dead body of the sergeant lying in the road, watched over by a faithful dog that had accompanied him. This was the work of Cheyennes, not, however, of those of them that had been receiving the bounty of the government at Fort Fetterman, but of a small band of irreconcilables under a leader appropriately named "Old Bear," who persisted in maintaining an attitude of hostility towards the whites despite the influence and example of their more tractable brethren. Indeed, the great body of the Cheyennes were on the very day of this occurrence encamped near the post preparing to start for their hunting-grounds on the Powder River, and their presence there materially complicated the solution of the problem as to who were the perpetrators of the Mularkey murder, for Indians never, when it can be avoided, expose themselves with their women and children to the danger of reprisal and retaliation. Their own maxim of conduct being "a life for a life," their presence with their families

near a military post is pretty good *prima facie* evidence of their innocence of any act of killing committed in that immediate neighborhood. The Cheyenne village on this occasion was perfectly commanded by a gun that could at any moment have been trained upon it, hurling destruction and death upon all it contained; and I found it very difficult, therefore, to believe that with such means of retribution menacing them the Cheyennes were the perpetrators of this outrage. Besides the Cheyennes, the Arrapahoes were also encamped near the post; so that the same presumption of innocence as to this particular act existed in their case also, thus leaving the Sioux, roving bands of whom were frequently in the neighborhood, obnoxious to the strong suspicion of being the slayers of Mularkey. Having no mounted force, any attempt to find and take up the trail of the hostiles in time to effect a successful pursuit would be futile. I, however, sent for the head-men of the Cheyennes and Arrapahoes, and giving them to understand that I was very angry with Indians generally, asked them if they had anything to say respecting this outrage. They of course denied all participation in or knowledge concerning it. Then, addressing myself to the Cheyennes, I told them that I had reason to think that the party who killed the sergeant had gone up the Powder River road, the same that they were about to move on, and that I should expect them to find out the guilty ones and arrest and bring them back to me, and that they should recover and return to me the mule and equipments. This they finally promised to do if they could. I did not rely very confidently, however, on anything coming of it all, and therefore my surprise was as great almost as was my gratification when, a few days after the Cheyennes had departed, runners from them returned to the post bringing me word from Little Wolf and Dull Knife that they had ascertained that "Old Bear's" band were the perpetrators of the Mularkey murder, and that they intended to catch and punish them, and this was supplemented a few days later by the arrival of Little Wolf himself, bringing back the mule the sergeant had ridden. Little Wolf informed me that they had come up with "Old Bear's" party at night, and that his young men had charged their camp and had captured it and the mule, but that "Old Bear" and his followers had escaped. Some of this I took *cum grano salis*, but the substantial fact of the rendition of the mule there was no disputing. Having properly acknowledged this evidence of good faith on their part, I made Little Wolf and his companions a present of some rations, and they set out to rejoin their people.

The most powerful influence operating within our Indian system is that of the traders. From top to bottom of the Indian service its *personnel* from time to time changes,—all except the trader; he is perennial. Theoretically, he too has his time to fall, but practically he stays. His counting-room is the point of radiation of lines of influ-

ence as minute as the capillary ducts of the human body, and as powerful. If *his* Indians go to Washington to visit their Great Father, he goes with them; the interpreter, who is probably deep in his debt, varies the utterances of the chiefs to suit his purposes, and by his wily machinations he manages to defeat all efforts in behalf of Indians that do not coincide with his interests. My relation to the Cheyennes at Fort Fetterman was detrimental, of course, to the trading interest at the Red Cloud agency, where it was claimed these Indians properly belonged, and unceasing were the efforts made to effect a rupture of that relation. The Cheyennes themselves, although connected with the Sioux by marriage, and generally allied with them in war, were extremely averse to being associated with them in their village life, for the reason that, being weaker in numbers, they were robbed and lorded over by the Sioux, and for the further reason that the principles and the practice of the Sioux in regard to female chastity differed widely, for the worse, from that of the Cheyennes. What the Cheyennes most earnestly desired was the establishment of an agency for themselves, somewhere in the Northern country, or, if that could not be compassed, their continuance under military management at Fort Fetterman. The scheme of the government respecting them was to effect their transfer, peacefully if possible, to a southern reservation, and it was the partial consummation of this scheme that led to the recent tragic events in their history. In all of my councils with them I persistently endeavored to bring their minds to an acceptance of the government scheme of removal to the south, but without much success. Meanwhile, I regarded it as of prime importance that, pending their final disposition, they be kept away from the Red Cloud agency, because I knew that the influences to which they would be subjected there would be opposed to the realization of the government scheme; and, moreover, anticipating the hostilities with the Sioux that have since occurred, I deemed it better military policy, while the Cheyennes should remain in the Northern country, to have them so in hand that we might utilize them as our allies against the Sioux, rather than add them as a reinforcement to the latter. Finding my efforts to induce them to acquiesce in the policy of a removal to the south ineffectual, I tried to persuade them to ask for permission to visit Washington, hoping that, by an interchange of views with the authorities there, either the government might succeed in winning them over to acceptance of its scheme, or, if that failed, they might be permitted to have an agency of their own. After repeated refusals to accept this advice they finally adopted it, and, coming to me, asked that I would communicate to the Great Father their request to be allowed to visit Washington; this I immediately did, but the moment was inopportune, for, as it happened, Red Cloud was just then on one of his periodical visits to the Capital, accompanied by his retinue of traders and interpreters, and, the request of the Cheyennes being communicated

to him, he was made to say that a delegation from them was unnecessary, that they belonged to him, and that he would represent them. In consequence of this opposition of Red Cloud to their suit the Cheyennes failed to obtain the personal hearing at Washington which they so ardently desired, and which, had it been accorded them, I cannot but think would have resulted happily, both for the government and for them.

Even after my *quasi* agentship had been terminated and both the Cheyennes and Arrapahoes had been remitted to the Red Cloud agency for their subsistence and government oversight, they were constantly touching at Fetterman in their journeys to and from the Powder River country and their forays against the Shoshonees, and it was seldom that the tepees of members of one or the other of these tribes were not visible near the post. The Cheyennes and Arrapahoes got along very peaceably together. The latter were only about half as strong in numbers as the former, and although originally among the most fierce and warlike of the Indians of the plains, they were, much more rapidly than the former, taking on a milder type of manners and character. Their declining numbers had doubtless much to do with this decadence from their pristine eminence in savage traits, and they had among them, moreover, a man whose influence probably operated as an auxiliary towards the same result. The man to whom I allude was "Friday," whose singular history, albeit not falling strictly within the purview of my subject, merits a passing notice. The tribe, many years ago, breaking up their village on the Cimmarron branch of the Arkansas River, divided into two bands, each taking its own direction. Friday was at that time a boy of about seven years of age. By some misadventure he found himself accompanying one band while his parents and family had gone with the other. Upon making this discovery he left the party he was with and started to find the one his parents had accompanied. He lost his way, and wandered about for days in a vain search for the right trail, till at last, overcome by hunger, fatigue, and cold, he lay down, as he supposed, to die. A passing trader found him, however, before life was extinct, and carrying him to Missouri, turned him over to the Jesuit fathers at St. Louis. By them he was cared for and instructed, with a view to making him, in after-years, a missionary to his people. He proved intelligent and apt, and became a respectable scholar in Hebrew, Greek, and Latin. When he had attained the age of sixteen, his parents then for the first having learned his whereabouts, made requisition on the government for him, and with much reluctance, both on his part and on that of the worthy fathers who had so long nurtured him, he was delivered to his parents at a spot near one of the military posts, in what is now the State of Colorado. So little, however, did he enjoy the prospect of a return to the savage life, that as soon as the shades of night had fallen upon the Indian village he stole forth, and

made a break for the camp of the party that had brought him out from the States. His attempt at escape was speedily discovered, and promptly frustrated by pursuit and recapture, and he was compelled to take up again the nomadic life of the plains. Had he been of maturer age at the time of this rendition, or, perhaps, had his character been of tougher fibre, the store of languages, dead and living, and, let us hope, the precepts of religion and morality with which the good fathers had furnished him, might have proved a valuable equipment for effort on his part toward civilizing and Christianizing his people; but, being what he was, only a boy, and sharing with us all that human tendency towards vagabondage that makes descent into savagery much easier than rising out of it, he became what he was when I knew him,—as thoroughly an Indian, to all outward seeming, as any of his companions. Almost his only distinguishing characteristic, beyond his knowledge of English, was a fondness for "fire-water," that could only be regarded as distinctive by reason of the proportions it had attained. And yet, despite all this, I believe, as I intimated before, that unconsciously to himself, and imperceptibly by his people, Friday has been an auxiliary of no mean effect in toning down the savagery of the tribe, and so rendering them somewhat more amenable to civilizing influences. The Arrapahoes at the time of which I speak were without a recognized chief, their headship being divided between Friday and a splendid specimen of the young Indian brave named "Black Coal." The two called one day at my quarters on some business just as I had finished dinner, and as I was alone at the time, my family having gone to the States, I invited them to eat; an invitation which an Indian as invariably accepts as does that approximate congener of his,—civilization's latest human product,—the tramp. My man of all work reset the table with the same attention to detail that he would have given it had my guests been in velvet and ermine instead of blankets and paint. Whether influenced thereto by a sentiment of respect for the aborigines, a hope that he might be gratefully remembered should the vicissitudes of war ever cast him upon their tender mercies, or simply by the fact of their being his master's guests, I could not say. Black Coal watched his proceedings with an expression of countenance that seemed to indicate an uneasy feeling in his mind, which, had it found vent in words, would probably have formulated itself into "heap dishes, mighty little grub," the to him unfamiliar display of china, glass, and cutlery giving forth a somewhat chilly aspect that was but faintly relieved by the piece of butter, midway of the table, which constituted all the food in sight, pending the warming up of the joint and vegetables. Friday's reminiscences of civilized ways enabled him to possess his soul in patience until the board, duly set, was ready to receive him and his companion, when he still further indicated the training of his youth by displaying a perfect familiarity with the several table articles and their uses, while

Black Coal was much hampered in the appeasing of his appetite by the necessity he was under of learning by observation of his more accomplished friend the mode of using the knives and forks and spoons with which civilization has supplemented aboriginal fingers.

My last council with the Cheyennes was a stormy one. It was after Fort Fetterman had ceased to be their appointed base of supplies that one day about five hundred of them came in, hungry and cross, asking for food. At the beginning of the council they were glum and moody, but not insolent. I received them kindly, but told them that I could not issue rations to so large a number of them without first obtaining the permission of the Great Father at Washington, as it was no longer intended that they should be subsisted at Fetterman, but at the Red Cloud agency, all of which they perfectly well understood. I further said to them that, as they seemed to be really suffering for food, I would ask the Great Father, by telegraph, for permission to issue them bread and beef sufficient to subsist them *en route* to the agency; that I might receive a reply that afternoon, but that possibly it would be delayed till next morning; that I would see them again in the afternoon and tell them whether I had received an answer to my dispatch or not. At the time for the reassembling of the council in the afternoon no reply had been received, and upon my informing them of this fact they began to manifest a very ugly spirit. Two of their young men had been killed by whites just previous to this, between Fort Laramie and the railroad, and one of their speakers commenced arraigning me and the whites generally for this offense, his harangue finding great acceptance with his companions, who, by their grunts of applause and angry looks, were evidently being worked up to a high pitch of excitement. When he had finished, I replied to him that the young men who were killed were stealing cattle, and had no business to be where they were under any circumstances; furthermore, that I had an unsettled account with them in the matter of my sergeant, whom their people had killed. To this they vouchsafed no immediate reply, but one of them, rising with great excitement of manner, ejaculated somewhat after this fashion: "What are you doing in this country, anyhow? You come here and kill our game; you cut our grass and chop down our trees; you break our rocks" (prospecting for mines), "and you kill our people. This country belongs to us, and we want you to get out of it." Joe having got thus far in his interpreting, I stopped him, and directed him to tell the Indians that I had heard all that I proposed to listen to of that kind of talk, and that if they were not more civil I would turn them off the reservation, and if they ever set foot on it again I should treat them as enemies. The aspect of affairs at this juncture was threatening: the Indians were all armed, while the few of us who were present were unarmed; they were angry and excited, and, except for a diversion which most opportunely occurred, serious results might have ensued. But, fortunately,

just at this moment the telegraph operator came in and handed me a reply to my dispatch, authorizing me to issue the bread and beef. Transferring it to Joe, I told him to interpret it to the Indians. The effect was magical, and strongly controverted the traditional stoicism that they are credited with, for no sooner did they learn the contents of the dispatch than all their sullenness disappeared, smiles took the place of scowls, they crowded around me and the other officers present with a general shaking of hands and ejaculations of "how," and one enthusiastic brave, seizing my hand, intimated to me his opinion that the killing of my sergeant and of their two young men about balanced matters in that line, and that we ought now to drop the subject.

This, as I have said, was my last council with the Cheyennes. The Sioux were becoming restive, and the greed of traders, made potential by the unfortunate system, at the core of which it nestles like the "worm in the bud," had forced the Cheyennes to amalgamate with them, and undergo conversion from peaceful wards and possible allies of the government to active and relentless foes. Now, nearly eight years since the incidents I have narrated, old Dull Knife lies stark and stiff among the Nebraska bluffs, his warriors are either dead or in irons, the widows of his braves find refuge with their sisters of the Sioux, and Little Wolf plays the avenger among the ranchmen of the Niobrara.

GEO. A. WOODWARD,
Colonel U.S.A.

NEW CONSTRUCTIONS OF CANNON.

THE ARMSTRONG GUN.—New constructions in the manufacture of cannon date from the experiments made by Sir William Armstrong, in England, who, about the year 1855, proposed a breech-loading rifled cannon, having a steel tube, reinforced with cylinders of wrought iron, made by wrapping bars of that metal around a mandrel, and then end-welding the coil. This circumferential arrangement of the metal presented a strong resistance to all strains tending to burst the gun tangentially;[1] the strain acting longitudinally[1] on the gun was borne by the inner tube and the end-welding of the surrounding coils. The breech-loading system proposed by Sir William Armstrong was found to be essentially bad, and was discarded, but the system of construction of the gun being approved, was adopted by the English government, and in 1859 Sir William was made Superintendent of the gun-factories at Woolwich, and the manufacture of the Armstrong gun was commenced.

The first guns that were experimented with were, naturally, of small calibre; but, as the struggle between guns and armor had already commenced, the system of construction was early tested as to its capacity for resisting large charges in guns of large calibre. An examination of the wall of the piece shows that its built-up condition is well adapted to resist tangential strain, tending to burst the gun in the direction of its length, but that there is a seeming want of strength to resist longitudinal strain, tending to rupture the piece in the direction of its diameter. This seems to have been recognized early in the manufacture as a source of weakness, and it was provided for by shrinking around the inner tube a breech-piece extending from the rear of the tube to as far forward as the trunnions. This breech-piece was a forged tube of wrought iron, with the fibres running lengthwise of the gun. Around the tube, thus strengthened, were then shrunk the numerous coils, of slight thickness, which constituted the Armstrong system of construction. This construction necessitated much labor and expense in the work of turning down the numerous surfaces, and in transporting very frequently the constantly-increasing weight, but the object was to develop as far as possible the advantages of a built-up gun, where no

[1] These terms are adopted in this article, not from preference, but because they are in general use.

interior portion could be ruptured without calling on its surrounding parts for support.

THE WOOLWICH (FRASER) GUN.—Mr. Fraser, who was in the employ of the government at Woolwich during the superintendence of Sir William Armstrong, was retained there as Assistant Deputy Superintendent after the government had assumed the entire control of the works, and to him is due the credit of the modification of the Armstrong system of construction which is now known as the Woolwich gun.

Mr. Fraser's attention was early drawn to the labor and expense of turning many surfaces, and the frequent moving of heavy masses. He conceived the idea of making the coils thicker, thus reducing their number, and of welding them together, instead of shrinking them the one over the other; also of placing them the one before the other united by end-welding, instead of shrinking them the one over the other, breaking joints, as in the original construction. He thus delayed the time of shrinking the reinforce on to the inner tube until the mass had reached a large size. He considered that the frequent forgings under the hammer would improve the condition of his iron, and that the expense and delay of moving heavy masses so frequently would be avoided; besides, the more frequent forgings would enable him to use a cheaper iron for his coils. His system of welding coils together involved not only the union of coil over coil, but also the welding of them together endwise, and in this he recognized a means of increasing the resistance that the reinforcing coils could offer to longitudinal strain. The advantage gained in this direction was so great as to enable him to suppress altogether the "breech-piece," so that in his present construction the coils are in immediate contact with the inner tube, the resistance to longitudinal strain, given by the end-welding of the separate coils, being assisted by the welding of coil with coil. Mr. Fraser's improvement on the original construction has been recognized and adopted by the English government, which now reaps the benefit of it by being enabled to manufacture its guns at one-third less expense than under the Armstrong system.

It is not proposed, in this article, to go into the details of the manufacture of this gun; what has already been written sufficiently exhibits the system of construction. The Woolwich gun stands before the world as a success, and the system has been tested up to a gun of eighty tons weight. This would seem to be sufficient to not only establish its claim for consideration, but to recommend it for adoption; but, before such a conclusion could be arrived at, it would be well to subject the gun to a closer study than can be made by reading accounts of experiments on a practice-ground. We call attention to one essential feature that is claimed for it, which we state rather at length, for the Woolwich gun must be regarded as a standard in a certain sense, and references and comparisons may be made to it in describing other rifled cannon.

This gun is claimed as being the *safest* gun in use, and the grounds of this claim rest upon the material, wrought iron, of which it is constructed. It is always referred to as a wrought-iron gun, and whenever an explosive burst takes place, as has been the case, the steel tube is required to bear the odium. The question naturally arises, Why is the steel tube used if wrought iron is regarded as the most advantageous metal to be used? The answer is that it is impossible to construct a large cannon altogether of wrought iron. This is evidently the conclusion that has been arrived at by the English artillerists, and it is distinctly so stated by Sir William Armstrong in his testimony before the Ordnance Council, before whom testimony was taken when that board had under deliberation the proposals of Sir William Armstrong and others for the construction of a 35-ton gun. In reply to a question as to his opinions on construction, Sir William says, referring to his coiled plan, "I think the fact of the rarity of the failures in guns made upon this principle establishes the correctness of the principle. I am hardly aware of a single instance of a coil-made gun bursting, and in fact all the failures have been, not in the part which has been made of coil, but in that part which has been made of steel. All experience shows that the steel is much more liable to fail than the wrought iron, and it appears to me that if you alter the pattern so as to discard the wrought-iron coil in favor of steel, you are really discarding the part which has never failed." . . . "*I only introduced it originally as material for the bore on account of its superior hardness*, but I depend far more on the strength of the coil than I do upon the strength of the steel as far as the safety of the gun is concerned."

The inference to be drawn from this statement is that, if it had been possible to construct a gun wholly of wrought iron, in which the strength of the structure could have been combined with sufficient hardness of bore, Sir William Armstrong would so construct his guns; but he decides that it is impossible to obtain sufficient hardness in wrought iron to resist the effect of scoring, etc., in the bore, and consequently he is forced to line his wrought-iron tubes with steel, a metal which he condemns as untrustworthy.

Mr. Fraser also claims *safety* as the great feature of his construction. He says, "The primary condition laid down as a *sine qua non* in the royal gun-factory, in regard to ordnance, is that no gun shall burst explosively, under any circumstances, after proof; and indeed this condition is regarded as an absolute necessity in naval guns, and must be attained either by strengthening the gun or by reducing the charge. We prefer to strengthen the gun."

"It was proved by actual experiment that this condition had been attained in ordnance as large as an 18-ton 10-inch gun, as both 9-inch and 10-inch guns have withstood battering charges with split tubes, the former nature up to forty rounds, the gun at that stage being disabled

by the tube and muzzle part of the gun moving forward about two inches, the gun remaining unburst after one thousand and forty-nine rounds. The ultimate rupture of the 9-inch gun may be attributed to a defect visible in the end of the *thick* steel tube, some three hundred rounds before the termination of the experiment, which ultimately developed into a defect running spirally around the tube. The corresponding 9-inch gun used at the same experiment, but with a *steel tube not much more than half the thickness* of that in the other gun, went through the entire programme, namely, eleven hundred and seven rounds, this latter gun being still uninjured and fit for any service, proving two facts: 1st, that the thin steel tube was efficiently supported by the wrought-iron exterior, even after the tube had been much scored at the seat of the charge; and, 2d, that the thin steel tube was superior to the thick one. In the event of rupture, as a matter of course, the thin tube with thick outer coils must afford the greatest safety."

In the foregoing it will be seen that Mr. Fraser, like Sir William Armstrong, rests his claim for *safety* in the wrought iron, and that he alludes to the steel tube as an element of weakness which is necessarily present, but to guard against the weakness of which his large coils are claimed to be a security. Yet Mr. Fraser has no idea of abandoning the steel tube; he considers it necessary in order to supply "hardness and clearness of bore," as does Sir William Armstrong; and he thus supplies his testimony to the conclusion inferred from Sir William Armstrong's statement, before cited, that it is impossible, or at least injudicious, to construct a gun wholly of wrought iron.

Even if the claim of *safety* be conceded, yet the presence of this element of weakness has operated much to influence the *endurance* of the Woolwich gun, which, in many reported instances, has become unserviceable from the splitting of the tube, even when no serious results of explosion have followed. The cases of endurance which are recorded in the "text-book on construction" are naturally favorable exhibits, but in service we hear constantly of guns being landed from vessels in commission after comparatively few fires. What is then rated as the *lifetime* of a gun stands at a low figure, the firing being limited to a very moderate number of rounds. Five or six hundred discharges are considered a large number for the guns of ordinary calibre, and it was found necessary to return the 12-inch 25-ton gun for repairs and examination after a little more than one hundred fires. The *lifetime* here spoken of is not intended to mean the actual extent of the gun's endurance, but implies the extent of its present availability, the tube splitting, or the derangement of the vent, rendering it for the time useless. A split tube can be replaced, and a deranged vent rebouched, when the gun is again fit for service, but the limited number of fires before derangement of parts stops the firing is likely to be a matter of almost as serious import as if the gun were to burst.

In the study of the Woolwich gun, then, even conceding safety if only for the sake of argument, we find the splitting of the steel tube as an acknowledged weakness. This shows that some radical defect exists in the construction which stamps it as at least imperfect. The defect exists in the want of homogeneity in the wall of the piece. There can be no doubt that the Woolwich gun would be constructed wholly of wrought iron if sufficient "hardness and clearness of bore" could be obtained with that metal. Such not being possible, the bore is lined with steel, and additional strength is supposed to be secured by making it as thin as possible, the established thickness being two-ninths of the calibre. But, in however small a degree the steel may be introduced, its presence destroys the homogeneous character of the structure. This is apparent when we consider the elastic property of the steel, and the absence of that property in the wrought iron. In the steel tube, as used in the Woolwich gun, this property is raised to a high degree by oil-tempering, which increases the tensile strength of the metal, but at the same time raises its elastic capacity. Although the steel tube is, then, highly elastic, no effort is made to utilize this property, but, on the contrary, the effort is, from the first step in the construction, to suppress it. The desire is to take advantage of its property of hardness, ignoring its elasticity, and it may fairly be presumed that the ignoring the elasticity of the tube is the cause of the weakness in the construction.

The tube is closely pressed upon by wrought-iron coils, having nothing in the nature of their metal that harmonizes with the tube they inclose. The tube must retain its elastic property, however strong may be the pressure to restrain it, and at every discharge of the powder in the bore it will have a tendency to display this property by expanding. This tendency is, no doubt, restrained during the early fires made from a large gun by the close shrinkage of the coils, but, after repeated fires and continued efforts of the tube to expand, its constantly repeated blows against the wrought-iron surface in contact with it must have the effect of driving outward the wrought iron, which is made possible by the malleable character of that surrounding metal. If this impress be made upon the wrought iron, close contact will cease between it and the tube, for the elasticity of the steel will induce it, after each discharge, to resume its normal dimensions so long as its limit of elasticity is not reached. As soon as the close contact of tube and coil ceases the perfectness of the construction is destroyed, for the tube is not strong enough to sustain, without support, the force of the discharge; hence the tube cracks for want of exterior support, and the fact that all the failures in the Woolwich gun take place in the tubes would seem to prove that the cause lies in the inability of a metal like wrought iron to properly support an elastic metal like steel.

In what has been said thus far, the claim of safety in the Woolwich gun has not been disputed. It has been conceded for the sake

of argument, and because no instance could be cited where an explosive burst had taken place after a gun had been put in service. A claim of safety may be made early in the use of any gun; but it can only be allowed unqualifiedly after a long period of trial and actual experience in service, where the conditions favoring the piece may not always be so advantageous as on a practice-ground where all manipulations are performed by experts. There is also another reason, which obtains at the present time more than ever before, which involves delay in deciding on the safety of a gun; this is simply the fact that guns of new construction and of large calibre are very expensive, and the number of fires to which they are limited is very small as compared with that of the old cast-iron ordnance. The liberal allowance for target-practice is much curtailed, and much of the exercise of pointing and firing is done by simply snapping a wafer, or by firing a gun-barrel which is disposed parallel to the axis of the gun, and which is trained by the pointing arrangements belonging to the gun itself. We see, thus, that owing to the expense of the powder and projectiles used with guns of new construction, the gun itself is fired comparatively but a few rounds in a given time; thus much more time is required than formerly to decide on safety, for a certain number of actual discharges must be reached before the claim can be allowed.

In the case of the Woolwich guns, before the construction of the 35-ton gun, it was the custom of the Department of Artillery to have one gun of each calibre at the practice-ground at Shoeburyness, with which a certain amount of firing was done, from day to day, so as to keep the number of the discharges of these guns in advance of that of any other gun of those calibres that might be in service. The bursting of this experimental gun at Shoeburyness would determine the lifetime of any other gun of that calibre, and as their number of discharges approximated to that of the experimental gun, they would be withdrawn from service. The writer is not aware if this most admirable arrangement of providing for safety has been continued since 1872, or since the advance in construction beyond the 10-inch 18-ton gun; but, if over-confidence in the construction has led to its abandonment, it should be renewed in view of the sad accident which has occurred on board the turreted vessel the "Thunderer," news of which comes to us while this article is being written.

The bursting of a Woolwich 35-ton gun, while at target practice, is the most startling occurrence that has agitated the artillery world for many years, in fact since the introduction of the new constructions. The Woolwich gun has been proclaimed a success, and its chiefest claim for excellence has been made on the ground of its superior *safety*. An explosive burst, and a list of killed and wounded of forty-five officers and men, forbids allowing the claim, unless it can be clearly shown that fault in the metal, or unpardonable neglect in the manipulation of the

gun, will justify the conclusion that the defects were confined to this gun, and that they do not belong to the system.

The "Thunderer" has not been long in commission, it is natural to suppose that the guns with which she is armed have not been fired many times, so that the cause cannot be attributed to subjecting the guns to use after their lifetime was passed. Before being placed in the turret of the "Thunderer," it is probable that they had simply been subjected to the ordinary proof-trials, and were then put into service. It is to be regretted that the *chase* of the gun cannot be recovered, but an inspection of the remaining fractured surface ought to show if there was defective metal or defective welding in the coils. The natural conclusion would be, at the first, to suppose that a jam took place as the projectile passed along the bore, and that the wall of the piece was not strong enough to resist the strain.

But, supposing the metal to be good, what could produce a jam sufficient to produce such a result? If the projectile retained its form it would pass out of the bore, no matter how much the studs might be sheared, for instances are on record where the studs have been entirely sheared off without rupturing the gun. If the projectile burst in the gun, thus adding to the force of the charge of powder that of the bursting charge in the shell, the strain would have been increased and the bore badly scored, but a gun of sufficient surplus strength for all practical purposes should not have yielded to this cause.

As the telegraphic reports reach us from the scene of the disaster, there seems to be uncertainty in accounting for the cause. We have it stated that there was a space between the charge of powder and the projectile, due to the defective manner of loading the guns by depressing the muzzle, but this reason cannot be accepted as a satisfactory cause of such a rupture, for there are on record many experiments which show that a good gun will not be seriously injured by such treatment.

The last statement is contained in a cablegram in the papers of February 11, which reads as follows: "The following is the text of the Admiralty's announcement about the explosion of the gun in the turret of H. M. S. 'Thunderer.' 'The committee are agreed as to the cause, and they report that the gun, having missed fire when loaded with the battering charge, was again loaded with a full charge, and fired with both of the charges and the projectiles in the gun at the same time.'"

The telegraph gives us this as the official statement of the Admiralty, a statement not only to the navy of England, but to the whole world, which is attentively looking for explanation. The statement is as startling as was the report of the bursting of the gun. To a disinterested looker-on it is very hard to reconcile this statement with the known excellence of the gunnery drill and instruction in the British navy, a system of instruction which forms the model for all other nations. It is inconceivable to suppose that English gunnery lieuten-

ants and English seamen gunners, graduates from the "Excellent," could possibly have been guilty of such neglect, which it would be hard to attribute to a green landsman just shipped from the purlieus of a city. It is evident that this cause of the bursting of the gun was not the first one that suggested itself; this conclusion has been arrived at slowly, and it must be by inference, for all those who can give positive testimony on this point are dead. A knowledge of the evidence on which this statement is made will be eagerly looked for before it can be accepted as satisfactory. It is very desirable to vindicate the gun, and to protect Woolwich, but the reputation of Lieutenants Coker and Daniell is also at stake, as well as that of the seaman gunner captain of the gun, and very conclusive proof should be required before indorsing a statement which condemns men for a fault for which, if they were guilty, they have paid the penalty with their lives.

The first 35-ton gun that was made at Woolwich had a peculiar history, which it is interesting to refer to at this time.[2] It was the experimental gun, and was subjected to various trials, which resulted in cracking the tube. The gun was originally constructed with a bore of 11.6 inches diameter, and the experimental firing with it was for the purpose of determining the best charge of powder. While in its original condition, with a bore of 11.6 inches, the following rounds were fired, viz.:

4	rounds	with	75	pounds	powder,	projectile	700	pounds.
2	"	"	100	"	"	"	"	"
16	"	"	110	"	"	"	"	"
6	"	"	115	"	"	"	"	"
6	"	"	120	"	"	"	"	"
1	"	"	130	"	"	"	"	"
35								

The results not being as uniform, nor as satisfactory in other respects, as were desired, and it being strongly urged by many that an increase of the diameter of the bore would, by reducing the length of the cartridge, enable the powder to act more efficiently upon the projectile, the bore was increased to twelve inches, after which the following rounds were fired, viz.:

6	rounds	with	110	pounds	powder,	projectile	700	pounds.
13	"	"	115	"	"	"	"	"
14	"	"	120	"	"	"	"	"
33								
35								
68	rounds in all before the crack was discovered.							

The pressure upon the gun was noted during the firings, and at one round, of one hundred and twenty pounds charge, the remarkable pressure of sixty-six tons per square inch was recorded; this took place

[2] "Naval Mission to Europe," from which this article is mainly constructed.

after the gun had been increased in diameter, but no crack was discovered in the tube as the immediate consequence of this discharge, and there were, and are, some who doubted the correctness of the recording instrument, the pressure being more than that generally cited as the average pressure of the gas of confined explosions of gunpowder, usually taken at forty tons per square inch.

Seven rounds were fired with charges of one hundred and twenty pounds of powder after this pressure had been recorded, when a crack was discovered in the tube; the crack was near the bottom of the bore, in one of the grooves; it was about twelve inches long, and commenced about thirty-six inches from the breech-end of the tube.

It has been stated that a crack was discovered after the seventh fire subsequent to the recording of the inordinate pressure; it should be added that the bore was not visited during those seven fires, consequently it may be that the crack was developed at the first of those seven discharges. Such was the belief of Mr. Fraser. After the discovery of the crack in the tube, five rounds were fired with one hundred and ten pounds of powder and seven hundred pounds projectiles, and it is asserted that the crack did not enlarge in size. Mr. Fraser counts this as twelve discharges since the cracking of the tube, and thus claims the resistance to explosive burst shown by this gun, after the tube was split, as confirming him in his assertion, previously quoted, that "no gun shall burst explosively, under any circumstances, after proof."

So far as explosive bursts are concerned, dependent upon the splitting of the steel tube, we cannot cite any instance to refute the claim of safety made for the gun, and those conditions seem to be the ones on which Mr. Fraser makes his claim. He does not seem to have contemplated such a catastrophe as the transverse rupture of the gun, which took place in the case of the one which burst in the turret of the "Thunderer." The causes that led to this disaster must be looked for from other sources than the simple splitting of a tube; and whatever may be decided upon as having been the primary cause of the rupture, it is evident that the steel tube was unable to resist the longitudinal strain that was brought to bear upon it, and that the welding of the surrounding wrought-iron tube was not sufficiently complete to prevent the strain from tearing the coil asunder.

We conclude this portion of our subject with the remark that, for a nation that is content with a muzzle-loading gun, the experience with the Woolwich gun is satisfactory up to the 10-inch 18-ton gun, in which all the good points found in those of a lesser weight and calibre seem to be concentrated; but that, in advancing beyond the size of this gun, the Woolwich people have found themselves beset with difficulties which it has overtasked even their powers to surmount, and which have led them into the position of throwing doubt on their whole system of construction.

THE VAVASSEUR GUN.—Of guns of new construction none occupy a higher stand than those of Mr. Vavasseur, of the London Ordnance Works, England. Mr. Vavasseur was formerly connected in business with Captain Blakely, whose name is familiarly associated with the early manufacture of the guns now known as the Vavasseur guns. The gun is made entirely of steel, and, as such, is in strong contrast to the Woolwich gun, before described. An interior tube of steel is jacketed from the breech to the trunnions with steel, and around the gun thus formed are shrunk hoops of steel. The details of manufacture are omitted as not within the scope of this article; and as to the power of endurance shown by the gun, it will suffice for our purpose to state that no explosive bursts are on record; but that, on the contrary, the guns constructed on this principle have satisfactorily borne all the tests that have been imposed on them. These tests have not been confined to the practice-ground, for the batteries at Callao, Peru, were partially armed with these guns, and they did execution on the hostile fleet in the late war between that country and Spain. Large numbers of these guns have been supplied to China; some have been furnished to Japan; but the prejudice in favor of the Woolwich gun in England, and of the Krupp gun in Germany, has prevented them from receiving the attention in Europe which their merit entitles them to.

Both the Woolwich and the Vavasseur gun have for their basis a steel inner tube; but, as was stated in considering the Woolwich gun, in that construction the effort from the first in building up the gun is to suppress the elastic element in the tube, treating it as if it possessed only the dull ductile properties of the wrought iron which incloses it. In the Vavasseur gun, on the contrary, every effort is made to utilize this important characteristic of the metal, and in fact to derive strength from it, not simply making it play the part of a hard lining, depending for strength on the outer coils, but utilizing its own inherent strength, and making it take part with the rest of the structure in contributing its quota of the same character of support as is rendered by the outer jacket and rings. In a word, the gun is homogeneous.

The inner tube of steel is oil-tempered, increasing its elastic properties. This is surrounded by a jacket of the same material, which is not tempered, and which is shrunk on at a *very low tension*. This is an important detail in the construction, and the object of it is most reasonable. In building up a gun it is very important that all parts through the entire wall of the piece should be called upon to do a full share of work, the tube as well as its surrounding parts. The tube of the Vavasseur gun is highly elastic; by shrinking on the jacket at a low tension, producing no appreciable compression of the tube, the tube must develop a certain amount of its elasticity, under the pressure of a charge of powder, before it calls upon the jacket for support. In developing this elasticity it has already contributed somewhat towards

controlling the force developed in the charge, and, if it receives the necessary support from the jacket before the strain has carried the tube beyond its elastic limit, it will, on the ceasing of the strain, resume its normal dimensions, the jacket of steel acting in like manner; and thus, from the homogeneous character of the parts in contact, there can never be any danger of a separation of surfaces, which, as was shown in the case of the Woolwich gun, causes the tube to crack.

It will be noticed that the jacket in the Vavasseur construction, extending as far as the trunnions, not only supports the tube circumferentially, but also supplies the necessary strength in the direction of the length of the gun; it in fact fulfills the duty required of the "breech-piece" in the original Armstrong construction. Its importance in its present form is apparent, as no strength to resist longitudinal strain could be supplied to the tube if a series of hoops were shrunk directly upon it.

The jacket supplying all the strength required to resist longitudinal strain, the outer support is rendered in the form of narrow rings of steel. These are shrunk on at a *high tension*, the effort being to compress the inclosed jacket. We thus have in the Vavasseur gun what seems to be the most perfect theoretical arrangement of material, where each part is so adjusted to the other as to render at the same moment a united support. Were all the parts in the wall of the piece uniformly elastic, the inner tube might be carried beyond its limit of elasticity before experiencing the controlling power of its envelopes, and might thus receive a permanent set. The comparative lack of elasticity in the jacket and rings imparts to them a rigidity which checks the expansion of the tube before it passes its limit of elasticity.

There remains one point to be alluded to as one of difference between the Woolwich and Vavasseur guns. The character of safety claimed for the Woolwich gun requires that there shall be no chance of an explosive burst; consequently the failure when occurring is determined to the inside, and, as has been shown, the tube has been (until the late case of the 35-ton gun) the first part that fails. In the Vavasseur construction the effort is exactly the reverse, it being the desire to exhibit on the outside the result of weakness in the wall of the piece; and this is achieved without risking an explosive burst, which is as much deprecated at the London Ordnance Works as at the Royal Gun Factories. The extreme tension with which the outer hoops of the Vavasseur gun are shrunk on is designed to exhibit on the outside, by their splitting, when the wall of the piece has been overstrained; and it is confidently believed that the splitting of an outer hoop may easily occur without risking the safety of the inner portion of the gun. It may be here asserted, in support of this belief, that it is a well-known fact that in several instances the outer hoop of the Armstrong original construction has cracked without endangering the gun. Fire was suspended, of course, but the gun simply required a new hoop

shrunk on. This would be the case were an outer hoop to crack on a Vavasseur gun; but the advantage claimed is that the fact of the weakness of the wall is made at once apparent, whereas a failure of an inner tube cannot be ascertained without minute inspection, save by the rush of gas through the *gas-escape;* in action this may readily escape notice.

These remarks sufficiently set forth the great contrast that exists between the Woolwich and the Vavasseur gun. The principles of construction are diametrically opposed, the one to the other. They are both English guns, and the contrast shows the wide difference of opinion that is entertained by the rival partisans as to the most judicious method of construction. The Woolwich gun has the stamp of government approval on its side, but the Vavasseur gun must be recognized as being in all respects the most truly scientific, and as promising more endurance. The cheaper construction of the Woolwich gun is, of course, an important point to be considered by government officials, and it may be that this consideration has had much to do with their conclusions in adopting the gun; but if the expense of retubing after a limited number of fires were to be added to the original cost, it might be found that the gun that was the dearer in the beginning would prove to be cheaper in the end.

THE KRUPP GUN.—The first guns constructed by Mr. Krupp were of solid castings of steel, he having been the first to achieve the casting of steel ingots of sufficient size to form a cannon. With ordinary charges in moderate calibres these guns performed very well, the metal giving them a superiority in strength over cast iron; but as calibres increased, and greater initial velocities were required, it was recognized that all the arguments against trusting to a thick, solid, wall of cast iron obtained equally in the case of steel, and it became necessary to change the construction of the gun so as to take advantage of the increased strength consequent upon the system of *building up,* by which the outer parts of the gun are made to participate on a much larger scale in the total resistance than is the case in a solid wall. Accordingly, all guns of any size greater than field-pieces are now built up by shrinking, around a tube, successive layers of steel hoops, depending in number on the size of the piece. Many of the old solid cast guns of Krupp's manufacture are now turned down, and strengthened by having hoops shrunk on them.

The only gun in England with which the Krupp gun can be properly compared is the Vavasseur gun. The essential point of difference is in the use by Mr. Vavasseur of the cylindrical jacket which is shrunk around the tube before the hoops are placed in position. In the Vavasseur construction this piece is necessary to supply strength in the direction of the length, as the tube is only two-ninths of the calibre in thickness; but Mr. Krupp is able to dispense with the jacket in consequence of the greater thickness which he gives his tube, which, at the

seat of the charge, is about three-fourths of the calibre, while at the muzzle it is reduced to three-eighths of the calibre. In a 9-inch gun, this will give a Krupp tube a thickness of 6¾ inches at the seat of the charge, reduced at the muzzle to 3⅜ inches, while a Vavasseur gun would have a tube of uniform thickness of 2 inches.

The difference in the systems is also apparent in the manner of shrinking on the hoops. In the Vavasseur system the jacket of steel is shrunk on at a light tension, while in the Krupp system the first row of hoops is shrunk around the thicker tube at a high tension, the second row, when used as in large calibres, being shrunk on at a lower tension than the first.

In the Vavasseur gun the chase is reinforced with rings shrunk on, but, until lately, the Krupp gun has had to depend on the thicker tube to supply the strength required at this point. The neglect to build up on the chase has, in several instances, proved disastrous to the gun, and it is understood that in the future the Krupp gun will have rings on the chase. All the modifications that have been made in the Krupp gun indicate a gradual approach to the system of construction as embodied in the Vavasseur gun.

THE WHITWORTH GUN.—The only remaining gun which deserves notice under the caption of this article is that proposed by Sir Joseph Whitworth, whose application of a hexagonal projectile, mechanically fitted to a gun bored with a corresponding spiral, has been long familiar; but, with the exception of a few experimental guns, and some batteries supplied to the Brazilian government, there have been no guns of this system in use.

The construction of this gun is a central tube of steel, covered by a second tube extending the entire length, with jackets of steel (in his 7-inch gun four in number) shrunk on, the band carrying the trunnions constituting an additional detail. The central tube is bored through its entire length, and rifled to the point where it is tapped to receive the end of the breech-plug. The inner jacket laps the rear of the tubes, and is tapped to the rear to receive the first shoulder of the breech-plug. The outer jacket is fitted in like manner over the inner one, and is tapped to the rear to receive the second shoulder of the breech-plug. The breech-plug has three circular screw surfaces of different diameters, which thus enter three female screws,—one in the tube, one in the inner jacket, and one in the outer jacket. The vent coincides with the axis of the bore and perforates the breech-plug longitudinally.

There is, no doubt, merit in this construction. The gun is strengthened to resist strain in all directions, but the advisability of boring the tube through its entire length may be questioned, and a source of weakness may be recognized about the breech-plug; but the fact that the merits of the Whitworth gun depend so entirely upon the system of rifling has made it necessary, in regarding the piece as a candidate for

favor, to view it solely from the point of view which presents this peculiar characteristic.

Theoretically, a mechanical fit of parts is very desirable, but the form of a hexagon, which is that of the bore, involves the necessity of making the thickness of the walls unequal, the thinnest portion being at those points, or angles, where the effort that imparts the rifled motion to the projectile is most felt. These angles also afford a ready place of deposit for the residuum of gunpowder which is left in the bore; this cannot be removed by the ordinary sponge, making it necessary in the manipulation of the piece to use a scraper, followed by a wool or bristle sponge, and in the Brazilian experience with this artillery a lubricant was employed. These are practical objections of a very serious character, which, with others not here enumerated, have prevented the gun from receiving favor.

In connection with this gun it will be well to add that Sir Joseph recognizes that to develop all the power of the piece it must be able to endure immense strain. In order to provide for this he now manufactures a metal more dense even than forged steel, by compressing the steel while in a liquid state. He states that he has applied a pressure of twenty-five tons to the square inch, but he estimates that eight tons to the square inch are sufficient to expel air-bubbles, and that then reheating the ingot the metal may be compressed by hammering, thus producing a metal which may be regarded with certainty as free from air-cells, and as superior to all other steels. It is steel treated in this manner which is now styled "Whitworth metal."

The practical effect of compression of metal in a liquid state may be mentioned in Sir Joseph's own words: "In the ordinary mode of casting, the metal in cooling is a quarter of an inch to the foot shorter; so that if you have a column six feet high, it would be six quarters of an inch shorter when it was cooled. When we put on our pressure, in the first five minutes it goes down an inch and a half to the foot. That shows the quantity of air and gases that the molten metal contains."

The scope of this article is limited to the guns of new construction that have been adopted by governments, and the above comprises all that come under this head. The number of systems of new construction that have been *proposed* is very large, but the consideration of them is apart from our present task. In passing in review the various systems of acknowledged excellence, the object has been to group them in a convenient form for the purpose of comparison, so that the advantages and imperfections might be contrasted, always bearing in mind that we may, at some future day, be called upon to make a selection for adoption into our own service.

E. SIMPSON,
Commodore U.S.N.

NEW LONDON, CONN., February, 1879.

ARCTIC EXPLORATION AND THE NORTH-WEST PASSAGE.

THE Nares expedition, with its perfect organization, magnificent outfit, and scientific preparation, in which every advantage was taken of both previous exploration and predicted contingency, seemed to leave no loop-hole for unforeseen occurrence or untoward accident. High hopes of success and prophecies of triumph hailed its departure; with its return came controversy and discussion as to the existence or non-existence of a Paleocrystic Sea, and the wisdom of certain details of management within the Arctic regions.

The partial failure of this expedition has not, however, appreciably abated either the ardor of national or individual desire to solve the strange mystery of the north. It has contributed its quota of dearly-bought experience, its most valuable geographical and scientific discoveries, to guide the hardy navigator of the future in the Polar seas.

It is the object of this article to give a brief retrospect of some of the results attained by former navigators, results frequently of a magnitude strangely disproportioned to the crude means at their disposal, and to the meagre scientific knowledge of the times in which they lived.

The able and energetic sovereign who built a mighty city in the marshes of Northern Russia, and who earned his daily bread disguised as a Dutch sailor in the dock-yards of Holland, in order to learn the art of ship-building and found the maritime greatness of the country which he governed, could ill brook the idea that the shores of his vast empire should remain in part an unknown boundary. Having completed, therefore, the herculean task of conquering the savage hordes who inhabited the north of Asia, he determined to ascertain whether its northeastern extremity was connected with the continent of America.

But a mightier potentate had summoned Peter the Great to undertake a yet longer and more mysterious journey; and, in the city he had founded, he breathed his last on the 8th of February, 1725, but not before he had prepared, with his own hands and on his death-bed, instructions for a northeastern cruise, which he urged with dying lips upon his successor, the Empress Catherine I. The Empress took a lively interest in the matter, and appointed Captain Vitus Bering or

Behring, a Dane in the Russian service, to the command of the expedition.

On the 15th of February, 1725, a few days after the Czar's death, Behring left St. Petersburg with two lieutenants and a number of well-skilled artisans under his command. Traveling overland some four thousand five hundred miles, they reached Ochotsk, and on the 14th of July, 1728, the two vessels which he built for his cruise sailed from the Kamtschatka River. Steering in a northeasterly direction, Behring rapidly surveyed the coast, until, in latitude 67° 18′, finding no land either towards the north or east, and deeming it useless to winter on the coast, which rose in an abrupt wall, covered all the year round with snow, he stood to the south, and wintered in the same river from which he started. During the following year Behring made a fruitless effort to reach the American coast, and, returning, wintered at Petropaulovsky, on the southeastern shore of Kamtschatka. After various explorations conducted in these regions, in June of the year 1741 he sailed again with two vessels, the "St. Peter" and "St. Paul," and accompanied by two lieutenants. After maintaining for a short while a course to the southeast they stood east to make the coast of America, when a terrible storm, accompanied by a thick fog, separated Behring from Lieutenant Tschirikow, whom he was destined never more to see. On the 18th of July, Behring sighted the shore of the American continent, with its snow-clad mountains towering one above the other in lonely grandeur. The party landed and found traces of inhabitants, when, re-embarking, they surveyed the coasts towards the north until the small islands rendered navigation extremely perilous. Scurvy, that dreaded scourge of Arctic travel, now broke out among them, and attacked their chief, who had to keep his bed. And now commenced a hopeless struggle with thick fogs and head winds. On the 24th of September they sighted a high and rock-bound coast, desolate beyond description, and shortly thereafter encountered a dreadful gale, which drove them, helpless before its fury, for seventeen weary days. Blown hither and thither among the numerous islands at the mercy of the howling storm, threatened almost hourly with shipwreck, utter despondency, misery, and sickness produced discontent and insubordination. Behring was helpless either to counsel or command, while at one time the miserable remnant of the crew who were able to keep the deck were too feeble to furl the sails, so that the doomed vessel flew helplessly before the fury of the tempest. In the early part of November the ill-fated mariners once more sighted land, but while endeavoring to anchor, their vessel was lifted clear over a ledge of rocks into smooth water by the violence of the waves, and there they moored the ship. They moved the sick, who rapidly increased in numbers from lack of suitable diet, to miserable shelters erected on the land, and on the 8th of December, Behring, their gallant commander, breathed his last. The

wretched survivors buried him upon the island which still bears his name. Shortly after the captain's death their vessel was driven on shore during a fearful gale of wind, utterly wrecked, and their slender stock of provisions destroyed. Upon those inhospitable shores the shivering Russians passed the dreary months of winter. "On the whole," says Steller in his journal, "want, nakedness, cold, sickness and despair were our daily guests." Early in May they began to construct a small vessel from the remnants of the wreck, in which to escape when the ice should open up; after almost superhuman efforts it was completed, and launched on the 14th of August, when, humbly commending themselves to the care of Almighty God, they put to sea. On the 17th the frail vessel sighted the Kamtschatkan coast, and later in the month anchored once more at Petropaulovsky, where they were welcomed with the utmost astonishment as "men risen from the dead."

So ended for the time—in death, disaster, and utter misery—the discovery of the northwestern extremity of our continent.

The discovery of Behring forms the connecting link of the long chain of advances made by the nations of Europe, through several centuries, from West to East, along the northern shores of Russia and Siberia,—an advance effected mainly by means of persistent efforts to reach India and China through a northeast passage, and made ever memorable by such immortal names as those of Willoughby and Gilbert, Barents and Hudson. The Russians have borne no humble part in this progress north and eastward; they have contributed great stores of information to the world, and have striven nobly on the frozen path of Arctic enterprise. The vast tract of country, stretching for one hundred and forty-five degrees of longitude, between the White Sea and the Kamtschatkan Peninsula, has been surveyed and described by them, while their greater inurement to cold and privation during the long and severe winters of the north has ably fitted them for the task. From the year 1598, when Fedor Dyakow was dispatched from Tobolsk to the river Yenissei, —for the purpose of demanding tribute at the hands of the rude tribes of Samoïdes,—down to the year 1834, when Pachtussof was sent out by the Czar's government upon his second voyage, no less than sixty-eight organized Russian expeditions have been engaged in these noble undertakings. Deeds of heroism were done by the gallant commanders and their sturdy crews which challenge the admiration of more maritime nations, but suffering and danger of no ordinary kind were the common lot of all, while many of the vessels sailed from their northern ports with high hopes and undaunted courage and were never heard of more.

The next attempt of the Russian government, after the return of the survivors of Behring's crew, was made in the year 1765. It was held by many competent authorities that a passage to the northeast might be found, free of ice, in higher latitudes than those which had

yet been tried, and two vessels were dispatched from Archangel on the 9th of May, under the command of Captain Vassili Tchitschagof. All efforts to attain a higher latitude, however, than 78° 8′ proved unavailing, and the squadron on the 10th of June sailed for Spitzbergen, where a depot of provisions had been established for their use. Here the commander refitted, took on board provisions for a nine months' cruise, and once more set sail. For some three weeks he made unavailing efforts to effect a passage to the north, or westward, and after having sailed as far as 80° 26′ in a northerly direction, he abandoned the enterprise and returned home.

Meanwhile, the thirst for Arctic discovery, which had slumbered in England for more than a century, awoke once more, and under George III. the "Racehorse" and "Carcass" were fitted out, sailing from the Nore on the 4th of June, 1773. On board the last-named vessel served, as coxswain, a mere boy in years, with whose name all Europe was destined to ring at no far-distant time,—Horatio Nelson. The vessels made the Spitzbergen shore, and followed the line of coast until they were closed in by the ice, having made no higher latitude that 80° 37′. So hopeless was Captain Phipps, who commanded, of being able to clear the ice, that he had already made preparations to abandon the vessels and escape in the boats, when a gale of wind set them free, and on the 10th of August the expedition sailed for home, as the season was now too far advanced for any further operations. It is noteworthy that during this cruise the future hero of Cape St. Vincent and the Nile distinguished himself greatly upon one occasion by his reckless bravery, when one of the boats was attacked and nearly wrecked by a drove of infuriated walruses.

It was determined in England to make another effort, but this time by another route; and the great navigator, Captain Cook, the most illustrious seaman of the age, was selected to command the new enterprise, which was to sail, through Behring's Strait, from the Pacific to the Atlantic Ocean. In the mean time, the Hudson's Bay Company dispatched Samuel Hearne, one of its ablest employees, in search of a great mine of copper which was alleged to exist far to the northwest. The existence of this mine Hearne proved to be a myth, but not until, after two unsuccessful attempts, he performed a most difficult and dangerous journey across the American continent to the Pacific Ocean, which he sighted in north latitude 60°. At the close of this memorable journey, in which Hearne traced the Coppermine River from its source to the sea, some Esquimaux families, settled upon the coast, were treacherously murdered by his Indian guides with circumstances of great atrocity. On the 12th of July, 1776, Captain Cook sailed from Plymouth Sound in his old ship the "Resolution," directing his consort, the "Discovery," under Captain Clerke, to meet him at the Cape of Good Hope, while another vessel, under Lieutenant Pickersgill, was

dispatched, by way of Baffin's Bay, to meet the expedition after it had crossed the north of the American continent.

Sailing in company from Africa across the southern hemisphere, they made latitude 44° 50′, and on the 29th of March, 1777, entered Nootka Sound. After making careful surveys of the sound, and of Cook's Inlet, in Alaska, the expedition doubled Cape Prince of Wales, latitude 65° 45′ in Behring's Strait, and sailed northeast, when, on the 11th of August, reaching the centre of the strait, they found a depth of twenty-nine fathoms, the deepest water they had sounded between the opposite shores of the strait. Keeping through and beyond Behring's Strait to the northeast, standing in shore, latitude 70° 43′, to avoid a vast barrier of ice which rose before them like a wall, they sighted a promontory, a considerable distance to the eastward, which they named Icy Cape,—the farthest point attained in that direction until Captain Beechy's voyage in 1825. Further attempts to trace the coast-line in that direction proving futile, on account of ice and heavy fogs, the hardy navigator, after visiting the Asiatic shores and coasting along them as far as Cape North, deemed that the season was already too far advanced for further progress. Captain Cook took his course, therefore, for the Sandwich Islands, with the design of renewing his voyage during the following year. This design he was destined never to accomplish, for at the Sandwich Islands occurred the fatal affray which robbed the English nation of the greatest navigator of any age or country. Not the least important of Captain Cook's splendid achievements was this Arctic voyage. By means of it he established the geography of America's northwestern shores to the north and east of Behring's Strait, and the conformation of the Asiatic coasts in the same latitudes as far as Cape North. During his difficult and dangerous course he took numerous and accurate soundings, making also many valuable observations upon tides, currents, and other most important subjects. The intentions of the great mariner were carried out by his subordinates, Captains Clerke and King, who resumed the voyage during the ensuing summer. They failed, however, to advance along the shore of either continent as far as had been done the previous year, and gave up the attempt in despair. On the 27th of July they turned their prows homeward, making a brief stay at Petropaulovsky to bury Captain Clerke, who died after a lingering illness, utterly worn out by a voyage of three years' duration.

The overland journeys, and the voyages planned from time to time by the Hudson's Bay Company, although they did not have the northwest passage for their aim, bore fruit in the direction of Arctic discovery, and the battle for commercial supremacy in the northern portion of the American continent was waged with uncompromising bitterness. This conflict led to the formation of a new British enterprise called the Northwest Company. Mr. Alexander Mackenzie, a native of Scotland, and

one of the company's resident officers, conceived the project of penetrating across the continent from Fort Chippewyan, the farthest outlying station. In the early part of June, 1789, he started on the journey, reached Slave Lake, and on the 29th embarked in canoes upon the waters of the river which bears his name, which he navigated towards the sea, until he arrived at an island in latitude 69° 14′, naming it Whale Island, from the numbers of whales abounding there. From this point the intrepid traveler beheld a vast expanse of ice—the frozen Polar Sea—stretching away as far as the eye could reach, with a chain of mountains barely discernible on the horizon, trending northwards. Re-embarking on his homeward journey, Mackenzie reached Fort Chippewyan on the 12th of September, after an absence of one hundred and twenty-two days. Three years afterwards the same traveler started on another journey, with the design of penetrating across the Rocky Mountains to the Pacific Ocean.

The explorer ascended the Peace River nearly to its source in the mountains, and, after innumerable hardships, had to abandon his canoe, the party cutting a passage by means of which the boat and baggage were hauled up to the crest of the ridge. Under the guidance of a friendly Indian whom he engaged from one of the neighboring tribes, Mackenzie embarked upon another stream, but was forced to abandon it on account of rapids and obstructions and make a land journey of considerable length. After being hospitably entertained by the Indians of the Pacific slope he resumed his boat voyage, and on the 20th of July, 1793, reached Georgia Bay, on the Pacific coast, latitude 50° north.

Thus terminated this most adventurous journey; and, in strange contrast to the bombast with which Vasco Nuñez de Balboa heralded his advent to the shores of the Pacific, nearly three hundred years before, after a brief transit across a narrow isthmus, the Scottish traveler painted on the face of a cliff, in vermilion letters, the following simple legend: "ALEXANDER MACKENZIE. *From Canada by land, the 22d of July*, 1793." The veteran explorer returned by the same difficult route, and although the elements have probably long since obliterated the simple record of his achievements, the name of Alexander Mackenzie gilds the history of Arctic enterprise with no uncertain glory. The discoveries just cited stimulated the attempt of Captain Vancouver, formerly one of Cook's midshipmen, who endeavored to find a passage through the numerous islands on the Pacific coast, one of which still bears his name. But, after a careful survey of the coast from latitude 41° to 60°, he decided that no outlet existed and returned home. In 1815, Lieutenant Kotzebue, whose father had so distinguished himself in the field of literature, was furnished with a little vessel—the "Rurick"—of about one hundred tons burden, by Count Romanzoff, and dispatched to Behring's Sea. Entering the straits, he coasted along the

American shore, and in latitude 68° entered the sound which bears his name, in the hope that it might afford a passage to the eastward. A two-weeks' survey of the inlet, prosecuted with the greatest care, failed, however, of its desired object, and the baffled explorer returned to Europe.

The current of Arctic discovery now began to flow into its old channel on the Atlantic coast, and it will be necessary to take a rapid survey of what had been done in previous years on that side.

The stout master, John Davis, of Devonshire, on his first voyage, undertaken for the "worshipful" English merchants, reached the shores of Greenland, and, "so coasting," he says, "this shore towards the south, in the latitude of sixtie degrees, I found it trend towards the west. I still followed the leading thereof in the same height; and after fifty or sixtie leagues, it fayled, and lay directly north, which I still followed, and in thirty leagues sayling upon the west side of this coast, named by me Desolation, we were past all the yce, and found many greene and pleasant isles bordering upon the shore; but the hils of the maine were still covered with great quantities of snowe. I brought my ship among those isles, and there moored to refresh our selves in our weary travell, in the latitude of sixtie-foure degrees or thereabout." After remaining about a month, bartering with the Esquimaux for skins, Davis steered northwest across the strait named after him, making latitude 66° 40′, where he "ankered in a very faire rode under a brave mount" (Mount Raleigh), "the cliffes whereof was as orient as gold." Coasting thence to the south, he rounded a promontory and proceeded up a sound, which gave promise of the long-looked-for passage, until the end of August, when, without meeting any ice, he reached a cluster of islands in the centre of the inlet, some eighty leagues from its mouth. Navigation far beyond the islands seemed open and free from all obstructions, but storms and heavy fogs compelled Davis to sail for home. From the second voyage of the stout old mariner the London merchants who planned it expected great results, on account of the open passage to the westward, discovered the year before; and on the 7th of May, 1586, Davis sailed again from Dartmouth with four vessels under his command. On the 15th of June he reached his old anchorage in Gilbert's Sound, where he renewed his traffic with the Esquimaux, and stood across the bay until, on the 17th, he fell in with vast masses of ice in latitude 60° 8′. The crews now murmured loudly, complaining bitterly that "by his overboldnesse he might cause their widows and fatherless children to give him bitter curses." But Davis still held his course manfully along the ice until he discovered land in latitude 66° 33′. From thence, abandoned by one of his vessels, he proceeded farther on his cruise alone, in a small bark of only *thirty tons*' burden, but made no farther northing. In latitude 54°, on September 4, he felt "perfect hope of the passage, finding a mightie great sea passing between the twoe lands west," but

stress of weather compelled him to sail for home. On the 19th of May, 1587, Davis sailed from his old port in command of two small vessels and a mere pinnace, having had to prove that he could refund the cost of the enterprise from the produce of his fishing in the Polar seas. Leaving the two vessels to fish on the Greenland coast in the middle of June, Davis sailed northward in his tiny pinnace, and reached latitude 72° 12′ by the end of the month; but here contrary winds compelled him to turn westward, although he saw an open sea stretching away towards the north. Sailing west for forty leagues without sight of land, he was terribly beset by the ice, from which he did not extricate himself until the 20th of July, when he made Mount Raleigh and Cumberland Strait, the northern shore of which he followed for three days, and was then becalmed until the 29th. On the following day Davis writes, "Wee crossed over the entrance or mouth of a greate inlet or passage, being twenty leagues broad, and situate betweene sixty-twoe and sixtie-three degrees. In which place wee had eight or nine great rases, currents or overfalls, lothsomely crying like the rage of the waters under London Bridge, and bending their course into the sayd gulfe." This was no other than the strait which bears the name of the ill-fated Hendrick Hudson, who, with eighty-six comrades, was so cruelly sent adrift there in an open boat by a mutinous crew during his fourth voyage, in 1610. Davis failed to find either of his consorts, when, being short of water, and unprovided for further efforts, he turned homewards, reaching Dartmouth on the 15th of September. Although the old sailor had reached on his voyage a higher latitude than any former vessel had attained, he could find no further employment in the direction of his beloved enterprise. The merchants of those days, though thoroughly imbued with the hardy spirit of commercial enterprise, were eminently practical, and it was the common complaint of all men, "This Davis hath beene three times employed; why hath he not found the passage?" Moreover, Walsingham, Elizabeth's great secretary, was dead; the coming of the dreaded Spanish Armada was the one all-absorbing topic which engaged men's attention; and so the spirit of Arctic exploration linked with commercial enterprise slumbered, but only for a time.

And now follows, thick and fast, a host of noble names,—the names of men, the flower of manhood and of Christian fortitude, from whose heroic deeds we reluctantly turn aside from lack of space to chronicle their daring exploits even in the briefest manner,—such names as Barents and Weymouth, Bennet and Cunningham, Knight and Hudson. On the 17th of March, 1615, the stout ship "Discovery," fitted by the Muscovy Company of London merchants for her *third* Arctic voyage, set sail from Blackwall under Robert Bylot, who had already conducted three northern expeditions, and who carried with him as mate and pilot William Baffin, who had sailed before upon similar

occasions, and to whose great enterprise and knowledge the success of the undertaking was mainly due. The "Discovery" made Cape Farewell, on the coast of Greenland, about the 6th of May, entered Hudson's Strait on the 17th, anchored off Resolution Island on the 1st of June, and next day sailed along the northern shore of the strait "so well as the ice would give them leave to gett." On the 8th they made "a company of ilandes," calling them "Savag Isles, having a great sound or indraught betweene the north shore and them." Here they encountered the natives, "muche like to the inhabitaunte of Groyneland, saving that they are not so neate and artefitiall, seeminge to bee more and oncivill, raynginge up and doune as theare fishinge is in season." At the close of June they "raysed Salisbury Island," and steering northward, after much danger in the ice, passed an island which he called Mill Island, "by reason of the greate extremetye and grindinge of the ice." The daily perils which they now encountered might have appalled much stouter hearts than theirs; sometimes "the ship was hoysted aloft; and at other tymes shee having, as it were, got the upper hand, would force greate mightie peeces to sinke downe on the one side of her, and rise on the other. But God, which is still stronger than either rocks, ice eddy, or streame, preserved us and our shippe from any harme at all."

The ship now steered north, and hoped to find a passage near Cape Comfort; but "owr sudden hopes were soon quayld, for the next morninge, havinge dubbled the cape, when we supposed (by the account of the tyde) wee should be sett to the northward, it beinge a little or no winde, we were sett to the contrary." Shortly afterwards, having found the island subsequently named Baffin Island by Sir Edward Parry, and Cape Bylot, on Southampton Island, named by the same navigator, they were kept beating about, "havinge much foule wether, many stormes, often foggs and uncertaine windes," and anchored at Digges Island. From thence, finding that all prospects of further progress were gone, they set sail to the mouth of Hudson's Straits and homewards, anchoring in Plymouth Sound on the 8th of September, "without the loss of one man; for these and all other blessings the Lord make us thankfull." The following year the merchants sent out the "Discovery" again, with the same officers, to make a further effort, and to seek the much-desired northwest passage. In the sailing instructions, which were most clear and definite, occurs the following: "Then direct your course to fall with the land of Yedzo about that height, leaving your farther sayling southward to your own discretion; according as the time of the Yeere and Windes will give leave. Although our desires be, if your Voyage prove so prosperous, that you may have the Yeere before you, that you goe so farre Southerly as that you may touch the North part of Japan, from whence, or from Yedzo, if you can so compasse it without danger, we would have you to bring home one of the men of

the country; and so, God blessing you with all expedition, to make you return home againe."

On March 26, 1616, the ship left Gravesend, and on the 14th of May sighted the shores of Greenland in latitude 65° 20′. From the islands which they named Woman's Islands, where they had to take refuge, the adventurers pushed northwards, reaching another group in latitude 74° 4′; but an effort to sail westward was foiled by the ice, which beset them terribly, and forced them to seek shelter behind some islands in latitude 73° 45′. When a channel opened through the surrounding ice they stood north, passing a cape which they called Sir Dudley Digges', in latitude 76° 35′, Wolstenholme Sound, and in latitude 77° 30′, one which they called Whale Sound. Pursuing their course past Hakluyt Island, they named the next inlet Sir Thomas Smith's Sound, which, says Baffin, "is admirable in one respect, because in it is the greatest variation in the compasse of any part of the world known; for by divers good observations, I found it to be above five points, or fifty-six degrees, varied to the westward, so that a northeast and by east is true north, and so of the rest." On the 12th of July, in latitude 74° 20′, the vessel made Lancaster Sound, which was closed by impassable ice for two hundred years afterwards, until Sir Edward Parry found it clear. The mariners were now much beset by ice; and after a run to the eastward, when they had drifted into the "indraft of Cumberland's Isles and should know no certaintie, and hope of passage could be none; seeing that wee had made an end of our discovery, and the year being too farre spent to goe for the bottome of the bay to search for drest finnes, therefore wee determined to goe for the coast of Groneland to see if we could get some refreshing for our men." Scurvy had made sad havoc among the crew; but anchoring in latitude 65° 45′, they found scurvy grass in abundance, which restored the invalids to health, and, after a stay of eleven days at the anchorage, the vessel weighed on the 6th of August, steered for home, and reached Dover Roads on the 30th. On his return Baffin wrote an able letter to "the Right Worshippfull Master John Wolstenholme, Esquire," one of the projectors of his voyage, in which he gives a brief but graphic account of the expedition. This letter is to be found in the pages of his friend and contemporary, Purchas, who also gives a brief account of the adventurer's tragic fate. "Master Baffin told me," he writes, "that he would, if he might get employment, search the passage from *Japan* by the coast of *Asia;* but in the Indies he dyed, in the late *Oamus* businesse, slain in fight with a shot, as he was trying his mathematicall projects and conclusions." Little further information than this has survived to our own day of the career of Baffin subsequent to his last northwest voyage; but the mighty bay that he discovered still bears his name, which will be kept in honored remembrance to all time whenever truth and probity and heroic courage challenge the admiration of

mankind. Baffin's Bay has been the resort of whaling vessels for more than two hundred years, and the history of their honest toil and terrible hardships has afforded many a narrative of stirring adventure. The lovers of the curious may find one of the most interesting accounts of the whalers of the olden time in a pamphlet published in London during the year 1631, and "to be sold at the signe of the Sunne," entitled "God's Power and Providence shewed in the miraculous preservation and deliverance of eight Englishmen left by mischance in Green-land, Anno 1630, nine moenths and twelve dayes. With a true relation of all their miseries, their shifts and hardship they were put to, their food, &c., such as neither Heathen nor Christian ever before endured. With a description of the chiefe Places and Rarities of that barren and cold country. Faithfully reported by Edward Pellham, one of the eight men aforesaid, as also with a map of Green-land." In this quaint narrative Pellham draws a parallel between the hardships and suffering endured by his party and those encountered by the Dutch under William Barents during a similar enforced sojourn upon the northern shores of Nova Zembla in 1596; and as the spirit of commercial rivalry between the English and the Dutch was raging fiercely when Pellham wrote, his parallel is of course greatly to the prejudice of the latter.

The regions explored by Davis and Baffin, with the sounds opening from the northern extremity of the mighty bay, have been the theatre of modern daring and heroism of no ordinary kind, and have proved the route by which the farthest advances have been made towards the pole, and the highest latitude yet on record achieved; hence we have lingered over the story of these stout old mariners with their quaint narratives of adventurous toil. Nor can one take leave of them without a feeling of regret, for they are indeed most excellent and gallant company; for the most part honest, God-fearing men,—the brightest mirror of all manly virtues. The same high spirit animates all who bore a part in the long effort to conquer nature in the Arctic solitudes, from brave old Sir Humphrey Gilbert—who, just before his vessel foundered, cried out to his consort, as she drifted past through the howling storm, "We are as near to heaven by sea as by land!"—to the boy-coxswain with Captain Phipps, who, years afterwards, when bearing down to engage the enemy in his hardest won and greatest victory, cried, "Here goes for Westminster Abbey or a Peerage!"

It will be remembered that in anticipation of Captain Cook's success a vessel had been sent to Baffin's Bay in 1777, under Lieutenant Pickersgill; the lieutenant, after waiting some time in vain for his superior officer, returned to England, and after the arrival of Captain Clerke from Behring's Straits, nothing further was attempted by England in the direction of Arctic exploration for a considerable period. In the year 1818 the old thirst for Polar investigation was once more revived, after a lapse of nearly half a century. This revival was due

principally to Sir John Barrow, Secretary of the Admiralty, who had collected all the information concerning former Arctic voyages and written much upon the subject. Sir John showed that for the three preceding years there had been remarkably open winters, and that vast quantities of ice had consequently drifted down from high latitudes into the Atlantic Ocean, while, in 1817, the eastern shores of Greenland, which had been sealed up for four hundred years by an impassable barrier of ice, were found to be so accessible from latitude 70° to 80°, that a vessel from Hamburg had actually sailed through an open sea between Spitzbergen and the Greenland coast, nearly as far north as the last-named latitude. It was therefore determined in England to send out two government expeditions, upon a scale much more gigantic than any previous undertaking, and of a character thoroughly commensurate with the magnitude of the discoveries to be made. The first expedition, consisting of the "Isabella," three hundred and eighty-five tons, under Captain (afterwards Sir John) Ross, and the "Alexander," two hundred and twenty-five tons, under Lieutenant (afterwards Sir Edward) Parry, was directed to sail up Davis' Strait to a high latitude, and thence stretch westward across the north of the American continent, passing through Behring's Strait into the Pacific Ocean. The second undertaking comprised two vessels also,—the "Dorothea," three hundred and eighty-two tons, under Captain Buchan, and the "Trent," two hundred and forty-nine tons, under command of the immortal JOHN FRANKLIN, then only a lieutenant and commander. Captain Buchan was ordered to proceed with his two vessels to the coast of Spitzbergen, from whence he was directed to sail over or as near to the pole as possible, and then steer through Behring's Strait into the Pacific Ocean. All of the vessels were as staunch and strong as wood and iron could make them, while their provision and equipment were upon a scale of unexampled liberality. Captains Ross and Buchan, commanding the two divisions of the expedition, were directed to make thorough scientific observations and experiments during the cruise upon currents, tides, meteorology, the magnetic needle, and various topics of interest. The four vessels left England in April. The two vessels under Captain Ross were held fast by the ice, in company with forty whalers, near Waygatt Island, on the coast of Greenland, for three days, and after extricating themselves, on the 17th of June, were again nearly crushed to pieces between two enormous floes. After meeting with some Esquimaux, and beholding for the first time the strange phenomenon of red snow, Captain Ross kept to the northward, passed Wolstenholme's and Smith's Sounds, and stood in to Lancaster Sound, the entrance of which was perfectly clear of ice. Running in for a distance of some eighty miles, Captain Ross, claiming that he saw land ahead across the sound, which he then believed to be a mere bay or inlet, gave the order to put about, which Parry obeyed with great re-

luctance. Steering southward, Ross passed the entrance of Cumberland Strait, which he neglected to explore, and returned to England early in October. In the mean time the "Dorothea" and "Trent" reached Cherie Island, on the 24th of May, and anchored in Magdalena Bay, at the northeastern extremity of Spitzbergen, on the 3d of June. They had found the temperature unexpectedly low, and before they could clear the northwestern point of the island the vessels were caught in an ice-floe, which held them fast for thirteen days. Breaking loose from the floe, they took refuge in Fair Haven, whence they made sail once more, on the 6th of July, but when latitude 80° 15′ was reached, the ice once more effectually barred their way. For three weeks the vessels were beset beyond all hope of extrication, and in latitude 80° 34′ Captain Buchan was forced to decide that the effort to find a passage northward was at that time utterly impracticable. The movements of the ice ultimately freed the vessel, and determining to try the eastern shore of Greenland, Buchan sailed along the edge of the pack until a fearful gale of wind came on, which nearly wrecked both the vessels, and damaged the "Dorothea" to such an extent that all hope of further progress was abandoned, and the expedition returned to England, anchoring in the Thames on the 22d of October, 1818. The return of these two expeditions gave rise to much discussion as to the conduct of Captain Ross, and the existence of the land which he alleged he found stretching across Lancaster Sound, so as to bar further progress in that direction. Captain Parry was therefore sent out in 1819, with the "Hecla" and "Griper," and after wintering beyond Barrows' Strait, the western extremity of Lancaster Sound, thus correcting Ross's error, and making many important discoveries, returned to England. Now followed a series of expeditions, undertaken in rapid succession, through a long period of years; some of them were sent out with a purely scientific aim, but the majority were planned in connection with the all-absorbing Arctic drama, which, opening with the loss of Sir John Franklin and his gallant crews, has given to the world the most astounding record of hardy courage and of heroic devotion. To attempt even the briefest summary of these numerous expeditions would require a whole volume, while the discoveries which they made were mainly limited to explorations of the vast archipelago of islands, with the sounds or passages between them, stretching from 60° to 130° west longitude. In 1827, Captain Parry, after three memorable voyages in search of a northwest passage, tried to reach the pole by the Spitzbergen route, and his vessel being inclosed in the ice at the northern extremity of the island he pursued his northward course in boats and with sledges. After struggling forward, however, across the ice-floes for thirty-five days, through fearful rain- and snow-storms and heavy fogs, Parry found that on account of the steady southward drift of the ice the boats' crews had traveled no less than *five hundred and*

eighty miles to make a northing of some hundred miles, and on reaching latitude 82° 45′ the vain attempt was abandoned. This latitude was, however, the highest that had yet been attained, and the results of the expedition, with his persistent attempts to push as far as latitude 83°, in spite of the insuperable obstacles which barred his further progress, added not a little to the laurels that he had won in his former voyages. In 1833, Sir John Ross, sailing from the direction of Lancaster Sound, spent several dreary winters in the neighborhood of Boothia and among the various lands to the north of the American continent, and during one of the most arduous and prolonged expeditions on record discovered the north magnetic pole. In 1850, Sir Robert McClure succeeded, for the first and only time, in passing from the Pacific to the Atlantic Ocean. That gallant commander was sent out from England, in 1850, in command of the "Investigator," in company with Captain Collinson, who had the "Enterprise" under his charge. Both vessels were directed to cruise through Behring's Straits and thence eastward in search of Sir John Franklin. The expedition sailed through the straits in July, and the ships then parted company. On the 4th of August, 1850, McClure steered boldly into the heavy ice-pack, heading in a northeasterly direction, and on the 6th of September arrived between Banks' Land and Prince Albert's Land, about sixty miles from the eastern end of Barrows' Strait, which opens into Lancaster Sound. But here the brave mariner was hopelessly beset by the relentless ice, and although by means of sledge journeys he discovered the passage through Melville Sound into Barrows' Strait, the frozen water barred the way to his beleaguered vessel. In these dreary solitudes McClure and his gallant crew remained imprisoned during three years of toil and suffering, until they were found and rescued by Captain Kellett, of Sir Edward Belcher's expedition, which had been sent out from England by way of Baffin's Bay and Wellington Channel. McClure returned to England with Belcher's command, and thus the existence of a northwest passage was definitely settled after a long quest of many years' duration, involving the loss of many noble lives and the expenditure of untold treasure. Through this passage, so discovered, no ship has ever sailed.

Although America was last to enter the lists in the effort to prosecute Polar research, her attempts, although few in number, have been attended with gratifying success.

In response to a characteristic letter from Lady Franklin to President Taylor, asking for co-operation in her tireless efforts to rescue her husband and his gallant crews, several American expeditions were sent out. The expedition under Lieutenant De Haven, which returned from the Arctic regions in the fall of 1851, was followed by the memorable attempt of Dr. Kane, in 1853, who followed up the discoveries of Belcher and Inglefield. In 1860, Dr. Hayes followed the same route,

rendered valuable service to the cause of Arctic discovery, and added much, by means of careful surveys and exploration, to our knowledge of Grinnell Land. The farthest point towards the north attained by this expedition had been only surpassed by one explorer, namely, Sir Edward Parry, and in that instance the difference was only a few miles. In the mean while various expeditions were sent out by the Swedes, the Germans, and the Austrians, some of them following the route between Spitzbergen and Nova Zembla, and others trying a course between the island of Spitzbergen and the eastern shore of Greenland. These various undertakings were dispatched during a period which extended from 1857 to 1872. Captain Carlsen, a Norwegian, succeeded, during the year 1871, in circumnavigating the island of Nova Zembla; but while this was the first time the feat had ever been accomplished, the voyage did not achieve as high a latitude as had already been attained by Parry. The last Austrian expedition, between the years 1872 and 1874, conducted by Lieutenants Payer and Weyprecht, during an effort to reach the pole through the route between Spitzbergen and Nova Zembla, was finally beset by the ice in latitude 76° 22′, and the vessel, the "Tegetthoff," was abandoned. The exploring party, after much hardship and trial, discovered a new tract of country stretching between the 80th and 82d parallels of north latitude, which they named Franz Joseph Land; the farthest land sighted reached above 83°. The expedition commanded by Captain Hall left Newfoundland, June 29, 1871, sailed up Smith's Sound, and reached the 80th parallel about the end of August. Thence it proceeded up Kennedy Channel and into Robeson Channel, which was followed to 82° 16′ north latitude, being the highest point up to that time attained by any ship. The "Polaris" then returned to winter in Thank-God Harbor, a point on Robeson Channel, in latitude 81° 38′. During the early autumn of the same year Captain Hall make a sledge journey northwards, reaching latitude 82° 3′, and returning from this journey, was taken ill, and died November 8, 1871, when Captain Buddington, the former sailing-master, succeeded to the command. The "Polaris" left her winter quarters in August, 1872, and on the 15th of October being fast in the ice about latitude 78° 20′, and leaking badly, a part of the crew, while landing provisions, were separated from her by the breaking up of the ice-floe, and drifted rapidly southward. On April 30, 1873, the party was picked up by the ship "Tigress," of Newfoundland, in latitude 53° 35′ north. The remainder of the crew who were left on the "Polaris" were rescued June 23, 1873, by the Scotch steamer "Ravenscraig," about latitude 75° 38′. This voyage, although so unfortunate in its close, afforded scientific data of no ordinary interest, and the latitude attained was the highest at that time on record. The results of this last American effort led to the planning of a new undertaking by the British government, which, after mature deliberation, was

sent by the Smith's Sound route. The "Alert" and "Discovery," under Captains Nares and Stephenson, sailed from England in May, 1875, and left Upernavik, in Greenland, July 22 of the same year. Passing through Smith's Sound and Kennedy Channel, the "Discovery" wintered in latitude 81° 44′, but the "Alert" struggled on through Robeson Channel, rounded the northeastern point of Grantland, and found, not, as was anticipated, a continuous coast-line, but a vast ice-bound sea. Finding no harbor, the ship was secured inside a barrier of ice in latitude 82° 31′, the most northerly point to which a vessel has been carried. The winter which followed was one of the severest on record. For one hundred and forty-two days the sun was never seen, and the mercury was frozen during a period of nearly nine weeks. Upon one occasion the thermometer showed 104° below the freezing-point, and during two fearful weeks the mean temperature was 91° below the freezing-point. As soon as the sun reappeared sledge exploration began. One party went east, exploring the northern shore of Greenland, and the other explored westward, along the coast of Grantland. Captain Stephenson, of the "Discovery," crossed Robeson Channel to Polaris Bay, and erected over the grave of Captain Hall a tablet with a suitable inscription, which had been brought out from England for the purpose. The shores of Grantland were traced to longitude 85° 33′, while those of Greenland were explored as far east as (west) longitude 50° 40′. Lastly, a party under the orders of Commander Markham pushed northwards, and after unheard-of difficulties, on May 12, 1876, they planted the British flag in latitude 83° 20′ 26″, which is believed to be the most northern point ever reached by civilized man. After accomplishing these results the expedition returned to Great Britain, arriving at Valencia, Ireland, October 27, 1876.

There has been much discussion as to the merits of the various routes by which access to the Polar area is possible. That by way of the shores of Spitzbergen and the eastern coast of Greenland has yielded, slowly and stubbornly, but few and most unsatisfactory results. During his second voyage, in 1595, William Barents, the Dutch navigator, rounded the northern end of Spitzbergen from the west, within the 80th and 81st parallels of latitude. Again, in 1607, the Muscovy Company, of London, sent out the renowned Henry Hudson, who designed, if possible, to cross the pole itself. The highest latitude made by this enterprising navigator was 81°, off the northeast coast of Spitzbergen. In 1827, Sir Edward Parry, with his sledge-boats, reached latitude 82° 45′, when the ice-drift southward caused him to lose more northing than he could gain by the most desperate efforts, and compelled him to turn back, while the point which he thus attained has been the highest yet reached by this route. The efforts to reach high latitudes through the sea which stretches between Spitzbergen and Nova Zembla have been slightly more encouraging. Leaving

out of the account the numerous failures, extending over a period of several centuries, we find that in 1863 the Swedish expedition, under Professor Nordenskiold, sailing by this course, reached latitude 81° 42′, the highest northing which had been made up to that time by any exploring vessel. The latest Austrian expedition also, sent out in 1872, sailing the same seas, passed in sledges as high as 81° 57′, and sighted land stretching beyond the 83d parallel. But, illustrating the extreme uncertainty of the conditions to be met with in this route, the steamer of the expedition—the "Tegetthoff"—got no higher than latitude 76° 22′, and was there abandoned.

The route by Behring's Straits would seem to be the natural gateway to the pole. Through this narrow passage flows the majestic current of the *Kuro Siwo*, rolling its mighty volume of heated waters from the Indian seas, past the islands of Japan and the coasts of Alaska, into the Arctic Ocean beyond the straits. To this vast ocean-river are due the comparatively genial climates of the Aleutian Islands and the Alaskan shores during the summer season, while it would seem that such an enormous body of heated water would impinge deeply upon the ice-bound seas beyond. Such, however, does not appear to be the case. The extreme shallowness of the straits—averaging only from twenty to thirty fathoms—favors the rapid radiation of heat; and this, when the sun is below the horizon, produces its legitimate results in the formation of those vast ice-barriers beyond the straits.

The route by which the farthest advances have been made is that through Smith's Sound, and it is by this route, it is believed, that future efforts should be made, as most likely to be attended with satisfactory results. The existence of a seam of coal on the north shore of Lady Franklin Bay, in north latitude 81° 44′, gives this route unusual advantages, and provides an excellent base from which to prosecute further explorations.

H. W. Howgate,
Captain U.S.A.

THE LAST OF THE FORT FISHER POWDER-BOAT.

[THE following paper on the subject of the powder-boat experiment at Fort Fisher was written in 1871, and was called forth by an article which appeared in the *Atlantic Monthly* of May, styled "The Fort Fisher Expedition." It was sent to that magazine shortly after the appearance of Mr. Lockwood's article in the May number, but was returned by the publishers with the flimsy excuse for not inserting it that "as Mr. Lockwood's second paper was already in print, my reply was too late." The two articles, May and June numbers of the *Atlantic*, were written evidently in the interest of those whose desertion caused the failure of the first expedition, and the loss of many lives and much expenditure in the second attack. That the first expedition would have resulted favorably had the landing party performed their part of the work no one in the fleet doubted, and many of the troops who were closest to the fort on the evening of December 25 shared that opinion, I think, for it was reported that the colonel of a New York regiment, which was in the advance, offered to carry his men in that evening, and I heard two engineer officers on Butler's staff inform Admiral Porter that some of the men of that regiment had captured a bearer of dispatches and his horse in the fort, and brought away a flag. The powder-boat was taken in on the night of December 23 under positive orders from the Admiral, as follows:

North Atlantic Squadron, U. S. Flag-Ship "Malvern," at sea,
NEW INLET, December 23, 1864.

SIR,—You must make your arrangements to go in to-night unless the gale comes on again. I shall go in and attack to-morrow. Make your arrangements with Captain Watmough, and don't fail me. The tug "Moccasin" is at your disposal to communicate with Captain Watmough; let him have plenty of lights over his stern.

Respectfully, your obedient servant,
D. D. PORTER, Rear-Admiral.

COMMANDER A. C. RHIND.

Captain Watmough referred to in the order commanded the "Kansas," a vessel which was to keep lights displayed to guide the powder-boat on her course in. The "Kansas" was anchored in about six

fathoms, out of gunshot from the fort, and where Mr. Lockwood *puts the "Wilderness" when she anchored.* After the fort was captured, the army engineers measured the distance to the wreck of the "Condor," a blockade-runner, that had been many months on the shoals. Mr. Lockwood accepted their yarn instead of relying on the official reports of the party engaged in the duty. The "Condor" lay just eight hundred and twenty-five yards from the fort. The following officers and men accompanied me in the powder-boat: Lieutenant S. W. Preston, killed in the second attack; Assistant Engineer A. T. E. Mullin, died September, 1877; Mate Paul Boyden, left the services after the war; Charles I. Bibber, now in service as mate; Robert Montgomery (captain afterguard), Frank Lucas (coxswain), Charles Hawkins (seaman), John Neil (quarter gunner), William Garvin (captain of forecastle), James Roberts (seaman), James Sullivan (ordinary seaman), Dennis Conlan (seaman), William Hinnegan and Charles Rice (firemen). The principal officers on board the "Wilderness" are mentioned in my letter to the Secretary of the Navy. The crew of that vessel was reduced for the occasion to just enough men to handle her. The reader of Mr. Lockwood's articles doubtless would infer that the officers and men who were on board the powder-boat were incited to undertake the duty by hopes of reward and promotion. The officers of the party got no promotion,—and not even the thanks of the Department. Mr. Mullin was ordered to be examined for promotion to the next higher grade, but as he would be entitled to that in a few months in any event, that could hardly be called promotion. Medals were given to the crew. Such was the spirit and discipline of the fleet at that time, that every officer and man in it was ready for that or any other service. I have referred to the effect of the wind and state of the atmosphere in cases of explosions of this nature, and in that connection give the bearing and distance of certain places where the force of the explosion was felt. These bearings and distances are taken from the Coast Survey chart, and are exact. The newspapers at Wilmington and the article in *Harper's Magazine*, written by a Confederate officer stationed there, describe the shock there as like an earthquake. Officers stationed at Beaufort felt the shock and noted the time, which corresponded very nearly with that of the explosion. Wilmington bears from Fort Fisher N. $\frac{3}{4}$ W., distance eighteen statute miles. Beaufort bears from Fort Fisher N. E. $\frac{1}{8}$ E., distance eighty-six and a half statute miles. As the wind on the night of the explosion was about S. W. by W., it will be observed that Beaufort was nearly dead to leeward.]

In the May (1871) number of the *Atlantic Monthly* there is an article signed H. C. Lockwood, and headed "The Capture of Fort Fisher—First Expedition." Mr. Lockwood's article appears to be written with a view to relieving General Butler and his advisers from

the responsibility of the failure of that expedition. It is not my purpose to discuss that question, but simply to notice and refute the misstatement of facts in that portion of Mr. Lockwood's article that refers to the part taken in the affair by the party in the powder-boat. So much that is false has been written and said about the powder-boat experiment, that I should not be surprised to hear that she was not exploded at all. As the commander of the party, I feel compelled, in defense of its reputation, to break the silence I have observed in regard to it and to expose those misstatements.

I have relied upon the official reports to give to those interested in the history of the affair a truthful version of it, but while perfectly indifferent to the opinions of General Butler and his associates in regard to it, I find that the official reports, and that not altogether reliable compilation styled "The Report on the Conduct of the War," are either partially quoted to suit the purpose of writers, or are incorrectly referred to. It was not till November, 1865, that I discovered the nature of the testimony given by General Butler before the "Committee on the Conduct of the War." I immediately addressed the following letter to the Secretary of the Navy, and asked authority to publish it; that authority was given, and the letter was published in *The Army and Navy Journal*, and copies of it sent to General Butler and to the members of the "Committee on the Conduct of the War." Almost every word of General Butler's testimony referring to the powder-boat is false, and neither he nor any other general or colonel or soldier of any rank, inside or outside of Fort Fisher, can possibly say with truth how near or how far from the fort the powder-boat was exploded, for the simple reason that she was taken in to her station in the dead of the night, exploded before daylight, and at daylight *not a vestige of her remained to mark the spot which she reached.* The party who carried her in, and those close observers on board of the "Wilderness," are the only ones competent to judge the case. The letter referred to as addressed to the Secretary of the Navy and sent to General Butler and the "Committee on the Conduct of the War" is the following:

"To the Hon. B. F. Wade, and to the Members of the Committee of Congress on the Conduct of the War:

"I discovered recently, in your report, some testimony of General B. F. Butler that required contradiction from me. I therefore addressed the following letter to the Hon. Secretary of the Navy. I request your perusal of it, and ask that be placed on the records of your committee.

"Respectfully,

"A. C. Rhind, Commander U.S.N.

"New York, November 16, 1865.

"To the Hon. Gideon Welles, Sec'y of the Navy:

"Sir,—In the published report of the Committee of Congress on 'the Conduct of the War' I find certain evidence of General B. F. Butler recorded which, as it presumes to question the performance of a duty assigned me, I cannot suffer to go abroad uncontradicted. A reckless disregard of the character and reputation of officers (especially of the Navy) and of the truth manifests itself in various parts of General Butler's testimony. Had I been aware that the proposition to employ the powder-boat as a preliminary to the attack on Fort Fisher was originated by General Butler, or that he expected such remarkable results from it, I should have required as a condition, on undertaking so hazardous a duty (unsought by me), that General Butler, or some one of his then numerous attachés, should accompany the party. My report of the conduct of the affair was very brief, as the Admiral and the officers of the squadron knew that the duty was in all respects properly performed; had I known that it would be criticised by those far from danger I would have enlarged the report, and appended to it the written testimony of Lieutenant Preston, my assistant, and other officers with me in the powder-boat and in the 'Wilderness,' her convoy. Most of these gentlemen are still in service, and to them I refer for the substantiation of what follows from me.

"On page 31, vol. ii., of the document headed 'Fort Fisher Expedition,' I find the following:

"'*Question by Mr. Lear.* How near was the powder-boat to the fort when it exploded?'

"'*Answer by General Butler* (he being at the time of the explosion at or near Beaufort, distant sixty or seventy miles). I do not know, and I do not believe anybody on our side does. The powder-vessel was a steamer, her machinery was reported out of order, or else they were so afraid of her that they did not dare to get up steam, and they towed her in. The proposition was to beach her within two hundred and fifty yards, but they did not do that, they anchored her and set her on fire. I know she could have run within five hundred yards of the fort. We were all very much surprised to find how near that shore we could lay. Our transports towards the last of our landing lay within one hundred yards of the beach. The powder-vessel might have been beached within one hundred and fifty yards of the fort, but it was not beached, it was anchored, and I do not believe within two-thirds of a mile of the fort.'

"*Now for the facts.* The machinery of the powder-boat was *not* reported out of order. Steam was raised on her on the 18th of December, a few hours after leaving Beaufort, in tow of the 'Sassacus,' and she was constantly under steam from that time until the morning of the 24th of December, when she exploded, riding out, meanwhile, a

heavy gale with her officers and crew on board. The vessel was slow and deep in the water, and a swift tug was provided to bring off the party in the powder-boat when used; that tug, the 'Wilderness,' Acting Master H. Arey commanding, had on board Lieutenant R. H. Lamson, Mr. J. S. Bradford (Assistant of the Coast Survey), and Mr. Bowen, the pilot. To secure a proper position for the powder-boat without loss of time, it was determined that beside using her own steam, the 'Wilderness' should pass a line to her, thereby preventing the separation of the vessels in the night and the powder-boat drifting from her course. The plan of anchoring her was adopted by common consent as the best, and was suggested by Admiral Porter. She was accordingly anchored *within three hundred yards of the beach abreast the fort*, Lieutenant Preston and all the officers concurring in the distance named. The 'Wilderness' having cast her off at a sufficient distance to prevent herself being seen, *the powder-vessel steamed in unaided to her station.* Arrangements were made to veer her in ninety fathoms closer after anchoring, which ninety fathoms would have put her stern in the breakers if she could float so far without touching bottom. Owing to the undertow the vessel did not swing so as to allow us to veer the ninety fathoms, she was therefore made secure at the distance named (*i.e.*, within three hundred yards of the beach abreast the fort) by letting go another anchor after the fuses and fires had been started some minutes. The fire was started as a last resort to make the explosion certain if the fuses failed, and was so placed in the extreme end of the shaft alley that it was not expected to reach the powder until after the clocks failed, and doubtless would not had the clocks been suitable for the purpose. General Butler expresses surprise to find how near the beach the transports could lie when landing the troops. The troops landed nearly two miles above the fort, and where no shoals extended. The beach is what is called 'steep to' to the northward of the shoals at the entrance of the New Inlet, and a vessel can approach and float till beached. I regret that the committee did not do me the justice to summon me to reply to that evidence of General Butler. The following officers will support my statement, so much at variance with that of General Butler: Lieutenant R. H. Lamson, Mr. A. T. E. Mullin (Assistant Engineer), Mr. J. S. Bradford (Coast Survey), Acting Master H. Arey (commanding the 'Wilderness'), Mr. Paul Boyden (Acting Ensign), the pilot, Mr. Bowen, and the officers and men of both vessels. All of these gentlemen, as well as Admiral Porter and his fleet-captain, are aware of the opinion of Lieutenant Preston, my assistant, as to the distance reached from the fort, and the complete performance of the duty. In reporting the distance the powder-boat was anchored from the beach I carefully refrained from understating it; the opinion of other officers was *that two hundred and fifty yards was the extreme.* It also appears (page 255 of the Report) that my report of the stowage and arrangement of

the powder-vessel was submitted to Lieutenant-Commander Jeffers, the officer detailed by the Ordnance Bureau to superintend the stowage of the craft, and on page 250, that he, Lieutenant-Commander Jeffers, accounts for the failure of the clocks on the supposition that 'possibly the turn on the cylinder may have been taken the wrong way.'

"The stowage of the vessel was not properly completed when I went down in the 'Sassacus' to take her to sea from Norfolk, and I was obliged to spend some time that morning restowing and securing the powder in the deck-house. The clocks were common deck time-pieces, altogether unfit for an experiment of that magnitude. As to the idea expressed that 'the turns may have been taken the wrong way,' it is not worth notice. I was obliged to have the clocks altered at Beaufort to adapt them to the motion of the vessel, and before placing them finally, tested them, with the aid of Lieutenant Preston. Whether the vessel was blown up by the fuse or the fire is a matter of no consequence as far as the reputation of the officers who conducted the explosion is concerned.

"The following extract is from a letter to me, signed by Admiral Porter, dated December 17:

"'I would suggest by all means that the fuses and clocks be not depended on, but that a fire be lighted in the stern of the vessel.'

"And again, 'Now the danger of bilging and spoiling all the powder suggests to me the plan of anchoring, in case of a surf, close under the fort; the vessel cannot then be boarded without boats, and the fires put out and the vessel scuttled, all of which might happen if landed on the beach with a sea running in.'

"And again, December 23, 'Don't forget to build a good fire, for that is certain, and will prevent the rebels boarding her.' Minutes from the log of the 'Wilderness,' kept during these occurrences, and signed by Mr. J. S. Bradford, of the Coast Survey, now in my possession, show that 'the "Wilderness" cast off the powder-boat and anchored at 11 h. 40 m. P.M., that the powder-boat anchored at 11 h. 55 m. P.M. (thus steaming ahead fifteen minutes after leaving the "Wilderness"), the fort bearing W. by S. ½ S., breakers on shore, and embrasures of the fort plainly in sight.'

"Respectfully your obedient servant,

"A. C. RHIND, Commander U.S.N."

On page 626 of the *Atlantic* Mr. Lockwood states that Commander Rhind was selected to execute the plan for the explosion under an order of Admiral Porter's, in which he stated that the chances were "death or glory, honor or promotion." Mr. Lockwood is in error in regard to my selection for the execution of the plan. It was offered to me when my vessel was laid up for repairs, and accepted only on that account, and because I was informed that it was considered by the Navy Department

a necessary preliminary to the attack. I had a very poor opinion of the plan, and so expressed myself to Admiral Porter.

Referring again to Mr. Lockwood's article, he states (page 627): "Here the powder-boat again plays an important part. There had been four different appliances adopted for the ignition of the powder, —1st, a clock-work; 2d, lighted candles with fuses; 3d, slow-match; and, 4th, firing the ship. At about eleven o'clock on the night of 23d December the 'Wilderness' once more took the mammoth torpedo in tow and started in for the fort. The 'Wilderness' continued in until she was in *six fathoms* of water, when she cast the 'Louisiana' off. The powder-boat then steamed on until she was about eight hundred and fifty yards off the northeast salient of the fort, where she was anchored. (See Colonel Comstock's map.) On the other hand, General Whiting (who commanded the defenses of Wilmington) estimates this distance to have been between twelve and fifteen hundred yards, not nearer. (See Report on the Conduct of the War.)"

After this Mr. Lockwood goes on to quote a portion of my report, and such portion only as suits his purpose; he then criticises the manner in which the fuses were laid, refers to Lieutenant-Commander Jeffers's report and the Report on the Conduct of the War, and states that the suggestion to use the Beardsley electro-magnetic machine and wires to explode the powder "was not favorably considered by those charged with the execution of the plan." As for Beardsley's electro-magnetic machine, no sample of it was shown to those "charged with the execution of the plan." None was brought down by those charged with the fitting of the boat, as far as I know, and I have not the slightest recollection of having heard of the machine, and do not to this day know what it is. Mr. Lockwood anchors the "Wilderness" in six fathoms (thirty-six feet) of water. An officer of the Coast Survey, a first-rate hydrographer, and the best pilot in the squadron, Mr. Bowen, noted carefully the soundings on the "Wilderness." Instead of six fathoms, she was anchored in two and a half (fifteen feet). The powder-boat then steamed on until she was within three hundred yards of the beach, and brought up in *nine feet* of water, drawing at the time about seven and a half feet. The lead was cast and depth of water noted after she was anchored. Though preparations were made to veer her in ninety fathoms farther, if the chart is consulted it will be found that she could not be got in more than a hundred yards under any other circumstances than a heavy surf heaving her up on the beach. Mr. Lockwood refers to Colonel Comstock's map. If Colonel Comstock ever made a map, and plotted the position of the powder-boat on it, he must have drawn on his imagination, or relied on the veracious report of that brilliant engineer officer who measured off to the wreck of an old blockade-runner which had lain for months on the same shoal, and reported that the powder-boat was eight hundred yards off; that old blockade-runner

being about that distance, was mistaken for the powder-boat, whose cargo, if it did not destroy the fort, at least hoisted her so high that not an atom of her was ever seen again. I ran a line of soundings pretty close in the morning of the 25th December, and could see no sign of her, and Mr. Bradford made subsequently a close search, with like results. While on the map subject, I can inform Mr. Lockwood that the U. S. Coast Survey Office published the only chart which has the position of the fleet and the powder-boat correctly plotted, and when he is in search of maps to prove his statements I respectfully refer him to that office.

The brilliant engineer officer who measured the distance to the wreck of the old blockade-runner (portions of which I saw there two years ago) must, I fancy, be the one who came on board the "Malvern" flag-ship the day after the explosion, and being introduced to me by the fleet-captain, stated that he had been sent down by the War Department to report on the results of the explosion, but was of course under the circumstances (being nowhere near) dependent on me entirely for the necessary information as to the position and manner of exploding the boat. I showed this officer my report, just then finished, and plotted as nearly as I could the position of the boat on his chart. This officer, I am told, reported afterwards and stated in conversation at Washington that the powder-boat was anchored eight hundred yards from Fort Fisher. Mr. Lockwood quotes only that portion of my report which condemns the manner in which the powder-boat was arranged and stowed. With the preparation of the boat for use we who took her in had nothing more to do than to put in about thirty tons of powder additional at Beaufort, and to lay the fuse as best we could. Instead of circulating the fuse through the cargo in the hold, the officers who had that duty in charge neglected to lay any at all, and when turned over to me, an hour or two before putting to sea from Craney Island, the vessel was very far from being fit for the purpose intended. To make her so as far as possible, Lieutenant Preston and I worked unremittingly at Beaufort, and put down the fuse ourselves, fitted the clocks and all other exploding arrangements. The officers who loaded her at Craney Island—one appointed by the Navy Department and the other by the War Department—should be held responsible for the stowage of the boat. I made several trips to her while she was being loaded, but failed to see either of those officers on board. A gunner was superintending the stowage apparently. On board the ordnance-boat which brought those officers to Norfolk I had a brief conversation with the naval officer of the party,—Lieutenant-Commander Jeffers,—but gained no other information than a sight of the clocks and fuse afforded. The army officer I never saw at all. Some wooden tubes lined with zinc were shown me as a plan of his for laying the slow-match. I can here mention that the tubes were tried, but did not work. Had the persons who conceived

this patent method of blowing up forts consulted history rather than form crude notions from the accidental explosion of magazines and powder-lighters, they would have found several instances of successful experiments of somewhat similar nature. When Antwerp was besieged by the Spanish troops under Alexander Farnese, a fortified bridge was built by them across the river to complete the blockade. This bridge was destroyed and many of its defenders killed by a powder-boat exploded by means of a clock-work,—not a Yankee clock, but one suitably arranged for the purpose by a skillful hand. No person was on board, but it was towed out in the river, the drift being calculated for the tide, and the clock set for the proper time. As this powder-boat was properly managed, the explosive material carefully arranged and properly prepared, of the best quality, being confined in solid masonry, there was no mistake about it, and when she went up the greater part of the bridge went with her. ("History of the United Netherlands," vol. i.) Another somewhat similar experiment was made by the English. When the French fleet was anchored in the Basque Roads it was partially protected from the attack of the British fleet by an immense boom of heavy timbers, chained together and anchored ahead of the vessels. Lord Cochran (then captain in the British Navy) conceived the plan of destroying that boom by means of a powder-boat, and he succeeded. He also took the precaution of making a solid mass of his explosive material; but stone and mortar not being much in use on board ship, he adopted an expedient that would readily suggest itself to a sailor. He wrapped his powder-barrels tightly about with hemp cables, wedged taut with wooden wedges, and filled in the interstices, and covered the mass with sand, well rammed down. The boom was broken, the ships slipped their cables in dismay and ran aground, and could easily have been destroyed had the attack been followed up. It may be asked, Why were not similar precautions taken in the case of the "Louisiana"? The answer is, for the party who conducted the explosion, that they were not authorized to make any alterations in the stowage, and even had they been so authorized, no time was allowed for it. The whole business, up to the time of her arrival off Wilmington, and previous to the gale that ensued, was hastily conducted, and after the gale, which lasted nearly three days, my small crew was exhausted and glad to get an hour's repose on board the "Tacony," whose captain kindly sent us a relief till evening. Mr. Lockwood expresses surprise that General Butler, "who suggested the use of this immense torpedo," was not allowed the privilege of being personally present at its explosion. I can assure the gentleman that on that one occasion it would have afforded me great pleasure to have had the society of the suggester of the experiment, but I am inclined to think he was about as near as he really wished to be. Even in the fleet the poor powder-boat was regarded by some with about the same favor that would be shown a small-

pox patient in a public vehicle. Mr. Lockwood states, "the failure was not in the conception of the plan, but in its execution." If I have failed to convince the reader that the failure *was* in the conception and preparation of the plan, and not in its execution, I refer those interested to an article written by Mr. J. S. Bradford, U. S. Coast Survey, and published in the *Galaxy* for January, 1870. Mr. Bradford's article was for some reason mutilated, and consequently did not appear as prepared. It is, however, the most correct of all the statements that have been made concerning the expedition, and as Mr. Bradford is the man who sounded out the course for the powder-boat, and subsequently assisted on board the "Wilderness" in piloting her in, I think it will be allowed that he knows what he talks about. Could I have read Mr. Bradford's article before it was in print, I should have asked him to strike out some portions of it,—not any relating to the material facts, but simply some personal allusions to me.

It has been frequently observed that the effect of the explosion of masses of powder on objects near is controlled not only by the state of the atmosphere to some extent, but materially by the direction of the wind; that objects situated to windward of the point of explosion are not materially damaged, however near, while objects to leeward of and in line with the point of explosion suffer in proportion to the force of the matter exploded. The night that the powder-boat was ordered in was, in my judgment, not at all a good one for the occasion, being a nearly cloudless and starlight one, thereby exposing the vessel to the chances of detection; and the wind, though not fresh, was blowing nearly directly off shore. To that cause is to be attributed in a great degree the slight effect produced; for, although, as I stated in my official report, but a small part of the powder exploded, I think it safe to assume that fifty or sixty tons would, if properly directed, have produced something of a shock. An officer of the Confederate army, then in Wilmington, stated, in an article published some time after in *Harper's Magazine*, that the shock was distinctly felt there, and seemed like that of an earthquake. It was also reported, and though I do not assert it as a fact, I have reason to believe it, that the greater part of the powder put on board was condemned or of a very inferior quality.

A. C. RHIND, *U.S.N.*

February, 1879.

ARMS TO FIGHT INDIANS.

THE question how best to arm troops to fight Indians is a very important one, simply from the fact, now generally acknowledged, that the Indian of this continent, possessed of firearms, is one of the most formidable foes ever encountered on the field of battle.

To decide the question, it might be well to review the experience of the past in regard to the arming of troops for the general purposes of war. Before the introduction of breech-loading arms, battles were fought by troops in heavy masses, the line of battle being usually a solid double-ranked line, in which a *continuous* fire could be kept up only by virtue of numbers,—some portion of the men being always engaged in firing whilst the remainder were occupied in the slow process of charging the muzzle-loader then in use. To overcome the resistance of such a line of fire, which could of course place a very limited number of bullets in the air at the same time, bayonet charges of troops, generally in column, were resorted to, the troops being deployed, and using their own fire as soon as they had succeeded in carrying the position assaulted and silenced the fire, by overwhelming them, of the troops defending it. The defense of such a position was strengthened by posting artillery along it, and, if time permitted, by erecting small breastworks, now popularly known as rifle-pits, to protect the defenders, render their loss as small as possible, and induce them to keep up for a greater length of time a fire on the assaulting forces. Accuracy of fire for troops when thus acting in heavy masses was not deemed very essential, the principal object being to get the greatest number of projectiles possible in the air at one time. Hence the old musket (not rifled) was provided not only with a bullet, but with three buckshot, and sometimes with twelve buckshot in one cartridge, thus supplementing the slowness of fire with an increased number of projectiles. On the introduction of the rifle those "buck-and-ball" cartridges rapidly disappeared, and the practice of what sportsmen call "firing at the flock" gave way before the more accurate rifle practice. As troops improved in the use of the rifle, and it became manifest how destructive this might be made, special corps were formed wherein accurate firing was made a study; but it is remarkable how long old fogyism clung to good "old brown Bess" as the arm for the mass

of troops. The rifle, however, gradually gained ground, and when, by the device of Minié, it was discovered that a self-forcing bullet could be used, and the old slow process of rifling the bullet by patches, hammering, etc., dispensed with, the old armament disappeared and the *rifle* became the small-arm of all troops. Accuracy of fire now became of more importance, but the muzzle-loader was still too slow in action. There was not a sufficient number of missiles in the air at one time, and besides, when firing in masses, accuracy of fire did not play the important part which it should. It was all very well as long as men distributed singly, in couples, and in threes, and well protected by breastworks or the natural accidents of the ground, could coolly use their rifles with accuracy, but this advantage disappeared in the presence of an assaulting column, and hence the bayonet still retained its hold on military organizations. Human ingenuity was now taxed to produce the requisite rapidity of fire, and after an almost innumerable number of trials of all kinds practical breech-loading rifles were produced, with which the number of shots a man could fire in a given time was limited only by the rapidity with which he could manipulate the loading lever and handle his cartridges, and just after the close of our civil war competent breech-loading rifles and carbines were placed in the hands of our troops. Previous to this, however, many attempts had been made, and some of them very successful ones, to still further increase the rapidity of fire by the invention of *magazine* guns,—that is, rifles in which instead of the marksman handling his cartridges, this work was done for him by the mechanism of the piece, it being only necessary for him to work that. The arming of our troops, however, has not yet been pushed so far as to issue to them a magazine gun. They have now simply the breech-loading rifle. This is unquestionably an excellent arm. It is the best one our troops have ever had, but it would be premature to say it is the best that could be given them, and it is safe to say that it may be improved even without making it a magazine gun.

It would be absurd to deny that these improvements in arms have had a marked effect on the tactics of battle. It is safe to assert that a body of good, well-disciplined troops in position, and armed with the modern breech-loader, can successfully resist, as long as their ammunition holds out, the assault of any body of troops which can be brought against them in front, even were that body a swift-moving cavalry force; for the rapidity of fire is so great, and the storm of bullets so heavy and destructive, that the head of *any* column of assault would be *wiped out* of existence before it could make itself felt, and the assaulted line still be in just as good a condition as at first for destructive purposes. Cavalry could not reach the line with its sabres, nor infantry with its bayonets. It is not contended that there will not occur some few instances in war where, from a fortunate combination of circumstances, a charge with the sabre or bayonet may result beneficially, but the occa-

sions are so rare, that practically *the sabre* and *the bayonet* are *ruled out of modern military organizations.*

Now, when the wild Indians of this continent were armed with the lance and the bow and arrow, which last, at a distance of forty or fifty yards, was almost as deadly as the revolver, it was an easy matter for our troops, armed with the old buck-and-ball musket, to contend successfully with the red men, even though outnumbered ten to one. But the armament of the Indian has not stood still any more than ours has. The musket, which seventy-five years ago he looked upon with a feeling of horror and dread, we have placed in his hands. He soon discovered it was more reliable, accurate, and safe than his bow and arrow; that it brought down his game and enemy at longer distances, and with ordinary precaution was not affected by wet weather. Still, he had to become skilled in its use, for he discovered that he who was the most skilled killed the most enemies and got the most game, and at the longest and, for himself, the safest distances. As improvements went on in our arms we kindly transferred them to him; and as the arms improved so did his marksmanship, for his livelihood and safety depended upon it. When he got possession of the rifle it became a matter of lifetime study from his earliest boyhood to render himself a competent marksman, and as prowess in war and success in hunting are the very highest tests of manhood in a warrior, we can readily imagine what competition there is to attain perfection in the use of the rifle. When we recall too, how, in days past, a little Indian boy could rapidly gather a crowd of white spectators to look with wonder upon his feat of hitting with an arrow a dime tossed in the air, we cannot but be impressed with the almost unlimited capacity for marksmanship the Indian possesses.

This process of instruction in the use of firearms has been going on from father to son for nearly three-quarters of a century, the arms improving with the marksman and the marksman with the arms, until at the present day an Indian who cannot hit an object the size of a man at the distance of four or five hundred yards would be ridiculed by his comrades and laughed at as a squaw, who would be knocked on the head with a "coup-stick" in war and starve to death when surrounded by game. The day, then, for our troops to meet these warriors when outnumbered ten to one is past. Nay, more than that, they cannot contend against them successfully man for man, except under the most favorable circumstances, and then only by adopting the improved tactics of the Indians themselves.

This brings us naturally to the discussion of the Indian tactics, which are as different from those employed in civilized warfare in Napoleon's time and transmitted to us as one thing can possibly be different from another. Indians never act in masses except under the most desperate circumstances. We frequently hear accounts of the most desperate acts

of bravery by individual Indians, but these are usually isolated cases of bravado, and generally performed at a safe distance. An Indian who would *unnecessarily* expose his life with no prospect of benefiting his comrades would be looked upon as a fool. The absurd spectacle, so often laughed over, of the two idiots who (was it at the battle of Crécy?) stepped in front of their commands, and with bows and salutes begged that each might first open fire, has no place whatever in Indian warfare. The Indian's delight is to take every advantage possible of his enemy; surprise him if within his power, and do him all the harm he can, without suffering any himself. He is all the more pleased with himself if he can slaughter a whole party, the larger the better, without receiving a shot in return. He especially delights to take advantage of the white man, principally, it is thought, because it is pleasing to his vanity to demonstrate his superiority, in at least one thing, to the boastful pale-face; this of course independent of the material advantages which he derives from a surprise. He will crawl and wriggle like a snake, or lie as still as a statue for hours and hours, that he may gain certain information or an advantageous position. In action he takes advantage of every possible inequality of the ground, a stump, a stone, a buffalo wallow, anything to conceal himself from your sight whilst you are exposed to his. They fight as *individuals*, and still appear to be under control of their chiefs. A single warrior will ensconce himself behind a rock, or up a tree, and there for hours pick off man after man with his unerring rifle, seemingly unmindful of the chance that by the changes of the fight he may be surrounded by overwhelming numbers and cut off from all help from his comrades. As he takes no quarter he expects none, and will fight to the last gasp like a grizzly bear, or any other wild animal brought to bay. *Herein* lies his great advantage over any enemy drilled to fight in a body. The peculiar drill of men in masses, and the "elbow touch" of the regular soldier, admirable as they are in ordinary warfare, are utterly thrown away in contests with the Indian. We must drill our men to rely less on each other and more on their rifles, and impress upon them how formidable even a single rifleman is when, protected himself, he knows enough about his weapon to pick off men at four and five hundred yards. Hence in fighting Indians good marksmanship is the first requisite, for we have to contend against the *best marksmen in the world;* with these, who have been marksmen from childhood, we cannot expect to compete by the employment of men, many of whom never looked through the sights of a rifle six months before they are called on to shoot Indians! Hence *practice, constant practice,* must be had in order to perfect our men in the use of the rifle; but before the practice comes we must have, as nearly as practicable, a *perfect* rifle, because to practice with an imperfect one is to throw away our time.

To define what is at the present day a perfect rifle we must go the

"Creedmoors" of the country, and to the extreme frontier, where not only men's livelihoods but their lives depend upon the skillful use of the rifle. For the first time in our army history the arms used by the troops are sought after by the frontiersman, who will make use of almost any means to get possession of what he calls a "needle-gun." But after he gets possession of it, it usually undergoes a transformation if gunsmiths are accessible. The first thing to be done is to *ease* the trigger. No man can shoot accurately a rifle which requires a 7-pound weight to be brought to bear upon the trigger. This is sometimes *eased* by forcing in a small wedge of wood or leather in the space in front of the trigger; but the owner usually takes advantage of his first trip to the settlements to have a hair-trigger placed on his rifle. The next thing is to file down the front sight to a smaller size, and as soon as he can do it replace the rear sight by what is known as a "buck-horn" sight, discarding the elevating sight or "hausse" altogether. This, in our service, is graduated up to one thousand yards, and placed in the hands of men the vast majority of whom cannot hit the size of a barn-door at the distance of a hundred. His sights being now such as to enable him to draw what marksmen call a *fine* sight, and the trigger arranged so that the slightest touch of the finger fires the rifle, the frontiersman considers himself suitably equipped for war or hunting by the addition of a supply of metallic ammunition carried in a "hunter's" belt, called by the Ordnance Department a "*prairie*" belt, probably because it came from the *mountains*. It is true he has no elevating sight, but he knows that by drawing a *fine* sight his bullet goes right to the mark when this is within a certain range, and he soon learns how much of the front sight should be seen between the "horns" of his rear sight in order to reach certain other distances beyond point-blank, and having learned that, he is, for all practical purposes, a perfect marksman without bothering his head as to how many hundred yards are included in these distances.

A great deal has been said of late about the *superior* arms possessed by the Indians, and efforts are being made by the Ordnance Department to obtain specimens of these superior arms. It is possible that a very few may be obtained; but it may be safely predicted that their superiority will be found to consist chiefly in their being more accurately *sighted* and more suitably *triggered* than our rifles, and that the principal superiority in using them will be found to reside in the character and skillful attainments of the men who handle them.

From the foregoing it will be perceived that the rifle now in the hands of the infantry arm of the service, if resighted and retriggered, cannot be improved upon, at least so far as human insight can venture to predict the limit of improvement; but these two things, and the discarding of the bayonet, are *absolutely* necessary to render the arm what it should be to fight Indians with. That old fogyism and the ruts of the Ordnance Department will still continue to resist these modifications

is to be expected; but they will come in time, just as the rifle reached the hands of troops in spite of the routine affection for "old brown Bess." The day for wet-nursing soldiers is past, and those who have to use these rifles in battle will no longer hear with patience the reasons urged by those who serve at what Shunk used to call "the frontier" (U. S. arsenals) against giving the soldiers as good an arm as they are obliged to face in battle. I know nothing of the reasons urged against sighting the rifles properly, and the only one I have ever heard against the proposition to place suitable triggers upon them is the fear lest *somebody should be hurt.* Now *that* is just what we want, and if in preparing ourselves to hurt somebody we kill or maim a few of our own men by premature discharges, we can console ourselves with the reflection that *in the aggregate* we have saved life. But the fact is that this is no longer an objection against placing a *rifle* trigger upon a rifled gun, for the breech-loader is very seldom charged except just before using, and those who refuse or fail to give us an efficient rifle must be placed in the same category with the old woman who would not let her boy go near the water till he learned how to swim.

The question as to the propriety of arming the infantry with a magazine gun is an open one. I am disposed to think it not advisable, unless some simple and convenient magazine can be adapted to our present rifle, by which, on special occasions, eight or ten cartridges could be fired in rapid succession. It would be better to allow plenty of ammunition for practice, for without skillful marksmanship a magazine gun would only increase the waste of ammunition without a corresponding increase in its effect. We had better follow the example set us by our enemies, the Indians, who very seldom fire with great rapidity, and who make up for their smaller number of bullets by their increased accuracy of fire.

When we come to discuss as to how best to arm our cavalry against Indians, the question is a more formidable one. For if the Indian is a formidable foe to the infantry, he is doubly or trebly so to the cavalry. In the first place, he is a better rider than the ordinary cavalryman, and no wonder. There is no rider, can be none, so perfectly at home on horseback as he who has been a rider from his birth. This is literally the case with the Indian. Some of them are almost literally *born* on horseback. They are as much at home in the use of firearms on horseback as they are on foot, although of course not so accurate in their fire. *Any* Indian from twelve years of age and upwards can ride, *without saddle or bridle,* or at most with nothing more than a rope tied around the lower jaw of his horse, at *full speed* alongside of a buffalo, and, generally at the first shot, from revolver or carbine, kill or mortally wound his game, picked out at pleasure from the running herd. The men in any one of our cavalry regiments who can do this can be counted on the fingers of one hand, and with the average white hunter

it is ludicrous to look on and witness his frantic efforts to reload his firearm when once emptied. In *running away* from an Indian on horseback, the average horseman of the service is almost as much at the mercy of his pursuer as is the buffalo, and hence the aptness of the assertion of an old Indian fighter of the army, "When I *once* dismount my men to fight Indians, I *never* remount except to pursue them." In the pursuit of Indians on horseback the soldier is following a buffalo which has the advantage of shooting back. The Indian, moreover, has the advantage of riding an animal from which he can dismount at will, and when he desires to remount finds his well-trained pony standing quietly waiting for him. Hence our cavalryman needs an arm easily managed on horseback, from which he can fire a number of shots without reloading, and, in case he dismounts, one which will compete with the Indian's arm at long range. The cavalry carbine, it is said, does not combine these requisites. The cavalryman should, therefore, be armed with the revolver for close quarters, and be provided with a rifle with longer range and more accurate fire than the regulation carbine, and in addition be capable of firing a number of shots without reloading,—a rifle, that is, which can be efficiently used both on horseback and on foot. The infantry rifle does not meet these requirements. It is long and unwieldy on horseback, and besides is not a repeater. I believe that the Winchester, or some other rifle similar in character, having a good range, and capable on occasions of firing rapidly a number of shots without reloading, would be the most suitable arm to place in the hands of our cavalry. But here the question of *practice* comes in again with even greater force than before. For no matter how good the quality of the arm, it cannot be made to compete successfully with the same arm in the hands of the Indian unless those using it are skillful marksmen. Hence *practice, constant practice,* is absolutely essential, both on horseback and on foot, to render a cavalry company as formidable as it should be before it is hurled into a wilderness, where it is liable to meet a force three or four times its numbers. An Indian is equipped for war when he has a good firearm, with a reasonable supply of ammunition, one or two good horses, and a piece of buffalo meat, which for a part of the time he probably uses as a *saddle blanket.* The extra horses he leads or drives, and mounts a new one when the one he is on breaks down. To him the deepest and most rapid river is no obstacle to speak of on occasions arising for him to cross it. His horse is trained to swim it and draw him over it. Hence our cavalry to succeed more frequently than they do against this formidable warrior, must not only be well skilled in the use of a good rifle, but in general equipment must approach in lightness as near as possible to his, and must besides ride trained horses which can be made to cross rivers as he does. There is but one way to reach this proficiency of equipment, and that is by inaugurating a system of schools of instruction where both officers and

men can be thoroughly drilled in all these things. Unfortunately, the number of our troops is not great enough to enable the authorities to withdraw even a small part from active service in the field long enough to give this instruction, and we shall probably continue to fight the Indian with inadequate means as often as the encroachment of the white settler and the impositions practiced upon him by the agents of the government force him into rebellion.

Officers who serve on the frontier are frequently met with the inquiry, made with an air of astonishment, How do the Indians manage to get these good arms and their supplies of ammunition? There is but one reply to be made to this question, which is, that the government is represented on the frontier by a colossus. In one hand it holds a scourge, from the other is dispensed to the Indian the best improved means of resisting this scourge. Every trader at an Indian agency, every little frontier town, or country store, is an arsenal where Indians *or* white men can purchase the most improved firearms and any quantity of metallic ammunition that they can pay for. But is it possible, some will say, that the government permits this suicidal policy to be pursued? Well, no; it does not permit it now to the same extent it did, but it is a case of partially shutting the door after the steed is stolen, for only two years ago, when the whole Sioux Nation was arrayed in arms against our little force in the field, *boat-loads* of arms and ammunition were carried up the Missouri River, which were certainly not intended for the government troops.

J. G.

THE PURPOSES OF A NAVY AND THE BEST METHODS OF RENDERING IT EFFICIENT.[1]

THE purposes of a navy are more complex, important, and constant than are supposed by persons who only regard it as a means of offense and defense in war, and who are ignorant in a great degree of the training necessary to efficiency. Many suppose that in time of peace we need no navy, that should a war occur our merchant marine would supply us amply with officers and men, and as well with vessels, which, with the mere addition of fitments of armaments and appliances, would become formidable vessels of war. It is intended to show the important, not to say indispensable, functions performed by the navy in time of peace, and, as well, that a navy cannot be improvised capable of meeting an enemy having a *personnel* more thoroughly trained and disciplined, and provided with vessels built actually for war purposes.

A farmer surrounded by lean and hungry stock, ready to overrun and feed upon what was not hedged around, would be thought foolish were he to try to raise a crop, or even graze his own stock undisturbed, without in advance planting his hedges. In vain would he endeavor to supply the deficiency when his enemies were upon him.

The nation that would establish no carefully-devised system of defense against aggression from within and without, would be no wiser than such an improvident farmer. The army and the navy are the hedges of a nation, more or less properly planted and sustained, and are no less indispensable to a nation's security and prosperity than the hedges to the farmer. I hope to show that they do not occupy ground idly or unprofitably, that they bear their fruits,—none the less valuable to the nation because they are, as it were, common property.

There is hardly a projected "internal improvement" throughout our wide territory that has the shadow of national importance that is not planned, if not superintended in its execution, by the engineer corps of our army. There is not a menace to public order, or a riot, whose object is plunder, where the humble infantry soldier is not hailed as the useful and timely friend to the "man of good will," be he rich or poor.

[1] This article was written for THE UNITED SERVICE, and with the concurrence of the editor of the Quarterly it was read before the Washington branch of the U. S. Naval Institute at their February meeting.

You hear it said that these outbreaks should be met by "citizen soldiers," by the volunteer or the militia-man. The employment of such forces, without the aid of soldiers or of sailors, in the riots of July, 1877, was at no one point satisfactory; wherever there were disorders and no United States forces present there was great destruction of property, entire insecurity of life, and especially to the luckless wight who stood as a volunteer or militia-man the guardian of the lives and property of his fellow-citizens. The wrath of the mob knew no bounds against him, when, at the same time, the forces of the United States were not assailed, and their presence and authority respected. It seems to me that the lives of our citizens are of too much value to make them the targets of the blind rage of the mob, of the men who, under pretence of being laborers without employment, are disposed not to labor except upon their own demands, and to violently prevent others from laboring, yet quite willing to gain what they can by violence and robbery.

I beg your pardon for apparently wandering from the subject which is designed to be discussed, that of the purposes of the navy, the services of which, at the time referred to, were not without value. The soldier and the sailor were alike recognized as the friend of "men of good will," and their presence and their authority were respected by the mob.

The operations and objects of the navy are mostly afloat. On the high seas the navies of the world form a common police, without which life and property would be wholly insecure. The nation that in time of peace should disregard its obligation to perform its part of a common duty, would in time of war suffer disadvantages and losses which would be incalculably greater, arising from a want of preparation for defense and aggression. The spirit of piracy exists now as ever; there are no pirates, or rather piracy is rare, simply because the seas are policed by the navies of the world.

There are other purposes also in time of peace which employ the active energies of the navy: as an example we may refer to the expedition of Commodore Perry to Japan, in 1854. This event is so recent that it seems hardly necessary to more than mention it. Had this expedition not been sent, or had it been less ably commanded, it is altogether probable that the Japanese would still be an isolated people, instead of occupying a distinguished position among the nations, due to their high character and ability and to their great artistic taste. Let it not be supposed by those not conversant with the history of the expedition that it was used as a force to bring about commercial relations. It was in fact rather a formal exhibition of the appliances and advancement of European civilization, and a demonstration of the advantage which peoples derive from a free intercourse, not in matters of trade solely, but even in a greater degree to the speedy dissemination of knowledge due to the aggregate genius of many races and nations.

The only demand made by that expedition was the right of refuge in Japanese harbors to our vessels suffering shipwreck or injuries from stress of weather on their coasts. The Japanese were informed also that whilst the government of the United States desired commercial intercourse in the belief that it would be mutually advantageous, it recognized the fact that, even when allowed by treaties, it could only exist when it was found to promote the interests of both parties. Thus thirty-five millions of industrious, intelligent, and highly ingenious people were added to the family of commercial nations, due wholly to one of the purposes of a navy,—a fact at variance with the assertion that we have no need for a navy in time of peace.

This expedition, so ably commanded, was engaged in making all possible surveys to render navigation safe in those comparatively unknown and unvisited seas, and in pursuing a rigorous routine of training to officers and men, which was of the highest value in promoting the efficiency of the navy. It was in fact the commencement in our naval service of a more methodical and thorough training, that had become necessary through the use of steam as a motor and the improved armaments on board ship.

About the same time one of our vessels-of-war visited Paraguay, made a survey of some two thousand miles of the river Parana and its affluents, and did much to bring that nation, then isolated, into common relations with commercial nations.

By our navy officers the river Amazon has been explored from its head-waters to the sea, and now that magnificent stream is navigated its entire length. Only last summer hundreds of miles of the river Madeira, one of the affluents of the Amazon, was admirably surveyed by one of our vessels-of-war, which will serve ere long to enlarge the commerce of that region with our own and other nations.

Within the past eight years the navy has completed surveys wherever required of the water-sheds of inter-tropical America, from Tehuantepec to far up the waters of the river Atrato, leaving nothing in doubt as to the solution of the inter-oceanic canal question across this continent. It has at the same time determined by telegraphy with extreme accuracy the longitudes of many important points in the West Indies and on the eastern coast of South America, and has sounded two lines across the wide Pacific, and one from San Francisco to Australia, to facilitate the laying of marine cables.

The two large expeditions to the Pacific, the one commanded by the late Rear-Admiral Charles Wilkes, and the other under the command of the present Rear-Admiral John Rodgers, require mention, the valuable surveys made by them, and the civilizing influence which the visits of the ships of those expeditions exerted over the many savage inhabitants of the Pacific islands.

It will be remembered, too, that our navy did much in examining

the route for and in laying the first cable between Europe and America.

Surveying the oceans, with their innumerable islands, rocks, and hidden dangers, is the legitimate duty of the navies of the world, and, I may add, necessary to the safety of the commerce of the world. Unless this is done by them it will remain undone forever; hence it should be regarded as a duty in common. From its magnitude, it is a work of many years if apportioned out by agreement between the nations themselves, and when the whole field has been covered, from the constant physical changes, much of it would require re-survey, making this duty in fact interminable. It will not be presumed from this that vessels of war *acting as such* can make extended surveys either with economy or with extreme accuracy. Vessels built and fitted out for the purpose would be necessary to fulfill those conditions.

Our navy has furnished inspectors of light-houses and officers for the hydrographic duties of the Coast Survey, both of which are of great importance to our commerce and to that of other flags visiting our coasts.

I was reminded by an intelligent friend of the great advantage derived by our merchants in many foreign ports through the appearance occasionally of a vessel-of-war, especially in such countries as have unstable governments. A cursory examination of a chart of the globe will show the very great number of ports of this character, and the necessity of protection beyond a "moral support." On two occasions during a brief period, when Acting Secretary of the Navy, after conferring with the State Department, it became necessary to state with precision through our naval commanders what was expected on the part of the powers concerned, the response to which was prompt and satisfactory.

Such have been the purposes of the navy, more or less, since its formation; such will be its purposes, more or less, as long as it is efficiently directed, and as long as it exists in a state of efficiency.

The actual knowledge required to make a useful officer of the navy is diverse and considerable, and the training, special and onerous, can only be acquired by encountering the vicissitudes of the sea in varied forms over the wide expanse of the navigable waters of the globe; nor would this experience suffice without previous careful primary instruction. Every vessel-of-war properly commanded is a school of instruction; in every sea vessels-of-war are or should be engaged in making partial or extended surveys, in sounding out the depths of the oceans, and, as before stated, in maintaining the police of the seas, without which there would be no security.

At the breaking out of the civil war, the Prince de Joinville, who was conversant with our naval training, expressed a very favorable opinion, which was published at that time, as to the efficiency of our

navy. He stated that our people would not be disappointed so far as its operations were concerned. I will leave to others the expression of an opinion on this point, but call attention to what was anomalous and difficult in connection with those naval duties and their results. Hundreds of officers were appointed from the merchant service, many of them having excellent qualities and knowledge as seamen, who readily learned the routine of naval duty, and how to manage large numbers of men effectively on the deck of a vessel. They fully appreciated whatever was effective in the routine of the navy, and soon had practical experience in fighting ships and batteries, and the methods of instruction of the crews, adopted and carried out most effectively by the ablest officers of our navy. I feel sure that our officers in general will take pleasure in acknowledging the high character and professional ability of some of these officers, which would make them a creditable accession to any navy list.

A certain number of these volunteer officers, less gifted in the positive and special qualities which belong to the able officer, were less useful, and to a certain extent were disposed to depreciate what they could not comprehend or attain. It need hardly be added that these officers were in general inferior in proper conduct, without which effective officers cannot be made, however gifted they may be otherwise. The volunteer officers called into the service were many times more numerous than the officers belonging to the regular navy, and such would doubtless be the case again should we have a war with a great naval power. Hence the necessity of having a sufficient number of well-trained officers in the navy to meet the exigency which must arrive, that is, in fact, only a question of uncertain length of time with every nation. It would be impossible to conceive in advance the mass of confusion, of ill-directed effort, of misspent money, of national calamity and disgrace, which would ensue were we to act upon the supposition that a navy was of no use in time of peace and could be effectively improvised in time of war.

However able as seamen those of our merchant service may be, and however gifted in character as a class, they would require special training to enable them to effectively direct and control the operations of large numbers of men, in which they have no experience in the merchant service, and in the appliances and use of heavy ordnance in itself, requiring aptitude on their part, as well as considerable experience in gunnery on board of vessels-of-war of the officers who might be detailed as instructors.

In this connection the latent force that a nation possesses, existent and ever ready, in a large retired list of competent officers becomes apparent. The government of Great Britain so fully appreciates this, and the importance of promotion at a proper age, that to effect these objects several methods of retirement are offered. A rear-admiral may

retire at his option at fifty-five years of age, a captain at fifty, a commander at forty-five, and a lieutenant at forty; but when five years are added to their respective ages retirement becomes compulsory. If, however, an officer has not served for five years in some of the grades, or seven in others, whatever his age may be, retirement is compulsory. Under such regulations it is difficult to suppose that an objectionable or incompetent officer can be continued on the active list, and it is apparent also that some officers, at least of these grades, of high professional worth and unexceptionable character, must be retired without a suspicion even of mental or physical infirmity. A provision is made for advancement on the retired lists, carrying with it substantial benefits, establishing plainly the purposes of these compulsory retirements, which are indeed fairly expressed in the order.

The advantage derivable to a navy from officers attaining responsible positions in command before they are too old is a marked feature of the British system of retirement and promotion; indeed, it is fairly the object of retiring the officers at the ages stated. An officer kept too long in a subordinate position loses after a certain time the ability to bear what is known as "responsibility," and after that, whatever his character and professional attainment may be, he lacks an essential element to usefulness in a high grade.

Our system of retirement, or rather of replacement on the active list, through legislation, of officers who have been lawfully retired, seems calculated to seriously impair the efficiency of the service. Officers of the higher grades, of the best character, and who have rendered the best services afloat in the line of duty, pronounce upon the merits and professional qualifications of those who have become eligible for promotion by seniority. It would seem most difficult, if not impossible, to name another tribunal that would as well guard the interests of the government, and also that would be disposed to consider and protect the reasonable claims for advancement to the officer. It is usually assumed and asserted by those interested that an officer has a "right" to be promoted, and that great injustice is done when he is passed over or retired.

I suppose there exists entire unanimity of opinion among the officers present that our government should consider strictly its own interests in setting aside those officers who, from whatever cause, are not efficient, even though the disability should be from wounds received in action and the officer himself be a brilliant exemplar. It is presumed, however, that his merits have justly won, and entitle him to, a retired pay proportionate to his rank and his professional worth in the past. It is an injustice to consider that an officer not recommended for promotion, and who, under present laws, will be retired, may not have excellent qualities, and may not have done excellent service. I will venture to say that there is not one among us, of the older officers at least, who

has not a high personal regard and a warm friendship for many brother officers who have been compulsorily retired, when he believes too that the best interests of the service required such action on the part of the Retiring Board.

The intelligent discussion of this subject by the Institute will not fail to show whatever difference of opinion exists among its members, and it will serve to enlighten our friends on a very important point.

During a period of more than six years in charge of the office of detail, a position advisory to the Secretary of the Navy, making assignments to duty, as all present are aware, I have no recollection of any Senator or member of Congress pressing a recommendation for orders of any one against the reasons given, when fairly expressed and understood.

Nearly, if not all, of the legislative difficulties respecting the navy grow out of expressions of opinion on the part of ourselves, either crudely digested, or arising from personal or partial views and motives, through which a part of the navy, or its interests, is presumed to be greater than the whole. If we can agree among ourselves and present fairly the questions that belong to making the navy efficient to and through the Navy Department, I think there will be no difficulty in attaining a satisfactory end, so far as legislation is concerned.

In relation to the adaptation of vessels built for the merchant service to the fighting purposes of a navy, it may be said that there is not one in a hundred that with the same displacement would stand an equal chance in a naval engagement with the best types of vessels built for fighting. In general, inferiority of a vessel in time of war results in her capture instead of capturing her enemy. The result is altogether more serious than inferiority in the ordinary pursuits of commerce, especially when it is one of speed, and perhaps due to no greater difference than having a fouler bottom.

It may be assumed that all sea steamers hereafter built for our merchant service will have compound engines, with the boilers and the steam connections placed so high relatively with vessels built for war purposes, as to make the chances of striking them with shot or shell far more probable, and thus presenting increased chances of disabling the vessel. There is a popular error that compound engines give increased speed, when, in fact, they only effect economy of fuel when a vessel is kept at a high and uniform rate of speed. A vessel thus furnished has a conditional advantage of economy in fuel, advantageous in the ordinary pursuits of commerce, and, on the other hand, with disadvantages for a vessel-of-war, in having more liability to breakage from an increased number of working parts, with whatever disadvantages may exist in being compelled to carry a high steam-pressure to attain a fair speed. Whatever may be thought of the effect of an explosion of boilers for compound engines, so far as the safety of the hull is con-

cerned, or of the relative scalding effects on the crew between decks, with boilers having less steam-pressure, in either case when the shell of a boiler is pierced, all of the heat will escape instantly to the boiling-point, and as well of the water, which, owing to the increased pressure, is much hotter in the boilers of the compound engine than in those of the ordinary low pressure, considered with the normal speed. The view here presented, so far as concerns the relative values of compound and ordinary low-pressure engines for vessels-of-war, corresponds with that of a very capable officer who has commanded vessels having compound engines for several years, and who has a practical familiar knowledge of the ordinary low-pressure engines also, such as are common in vessels-of-war.

No wooden propeller steamers of any size are built except on this continent. A want of rigidity of frame, not of course demanded for the safety of the vessel, but for the security of the engines against bad lineage and consequent frictions, heating of parts, and then break-downs, makes them inferior to iron vessels when the latter are "sheathed" or are "composite," neither of which are common in our merchant marine, if they exist at all, and are not likely to be built for the merchant service, as their construction would be more expensive than the ordinary iron vessel.

There is no "composition" or paint known that will prevent the fouling of the iron bottom of a vessel, and that, too, so speedily that a month passed in inter-tropical or warm waters would so reduce the speed that a sheathed and coppered vessel of the same model and power would either overtake or run away from her, as might be desired. It follows that vessels with iron bottoms would be unsuccessful in capturing those with coppered bottoms, and, on the other hand, would be liable to capture, from a comparative want of speed, under the conditions that are unavoidable to cruisers.

There is another point fatal to the use of unarmored iron ships, and not "sheathed," for fighting purposes. Whilst a shot or shell enters them without special damage, when passing out on the opposite side it usually disrupts or tears off a whole sheet of plating, making it impossible for the vessel to be kept afloat when so injured. This was shown to be the case in the attack on Fort Obligado, on the river Parana, above Rosario, in 1845. The same result was shown in the sinking of the "Hatteras" by the "Alabama," and so quickly, too, that although the water was smooth there was barely time to transfer the crew to the other vessel before the "Hatteras" went down.

In short, the merchant steamer of to-day, with us, is not even well adapted to pursue and capture the commerce of an enemy,—certainly not if the bottom be of iron exposed to the action of salt water, from the rapid loss of speed before alluded to through fouling. Not only is the bottom covered by oysters and barnacles, but with a wonderful

vegetable growth, much like a thrummed mat applied to the bottom of a ship. So far as fitting them in any manner to meet vessels-of-war of equal tonnage successfully, the average result would prove entirely disastrous.

The war purposes of our navy demand at least the protection of our inland waters, such as Long Island Sound, and our great bays, as well as the immediate vicinity of the entrances to our principal harbors, so that no enemy could feel secure in those localities. We should also be able to send on the high seas, along the great routes of commerce, vessels capable of greatly injuring the commerce of our enemy, and no types of vessels could do this more effectively than the classes which we should build and send abroad in time of peace to police the seas, to serve as schools of instruction and to carry out the other purposes of a navy, which I trust have been shown to be substantial, indeed indispensable to the best interests of a great commercial power.

As for "convoys" and "blockades," we may suppose that they will be rare indeed. A convoy requires long and vexatious delays, and in transit a relative low rate of speed, which would make protection altogether doubtful. A blockade of a port, or even many of them, would only increase railroad transportation with us; the blockade of the ports of any country of Europe, even if considered possible, would serve only to make supplies of whatever kind arrive through the ports of friendly adjacent powers, to be transported by railroad.

There is so much diversity in the recognized weapons of naval power, and such a diversity of models of the means of propulsion and of displacement of vessels-of-war that will directly antagonize each other in war, that a great diversity of opinion must exist even among those best informed concerning them and their relative fitness for destruction,—the end in view. Those instruments, whether simple or complex, which will effect the best and most satisfactory results at the least cost are those which are the most worthy of adoption. Unless the end be kept rigorously in view, the consideration of the subject becomes ideal and intangible.

I venture the opinion that the time is not distant when the marine ram will take the place of the enormously expensive armor-plated gun-bearing ships of to-day, and when iron-framed steamers, "sheathed" and "composite," with good sailing and great steam-power, will form the cruising naval force, supplied with such aid as may be derivable from movable torpedoes, whether carried in torpedo-boats guided by a crew, or like the "fish"-torpedo, left to their own guidance when released.

I am quite aware of the existence of a strong prepossession on the part of many officers for wooden-built ships, and recognize some points of superiority which they possess, particularly in battle. Without entering into a close comparison between wooden-built vessels-of-war

and iron vessels of the "sheathed" and "composite" construction, I think that past experience has shown that hitherto constructors have failed to give the necessary rigidity to the frame-work of wooden propellers having long shafts, and hence the impossibility of driving them at a high rate of speed for any length of time without a break-down. The iron frame and sheathing of iron vessels, when sufficiently heavy and built with a proper distribution of metal, is practically rigid; whatever the unequal distribution of weights in sections as compared with their displacements, no change of model will occur, at least within the limits imposed by the distribution of weights, with ordinary batteries and other conditions required for vessels-of-war.

While the first cost of the "sheathed" and "composite" vessels-of-war will be slightly greater than that of wooden vessels of the same displacement, at least until we have a proper "plant" for their construction and experience in it, they will doubtless be found far more economical when the time for repairs arrives. When the frame of a wooden vessel requires repairs to any extent, the cost becomes actually greater than the construction of a new hull, and the result quite unsatisfactory, as the vessel is serviceable only for a short time, and then is added to that long list of disabled or partially serviceable vessels with which our navy is unhappily filled. On the contrary, the vessel having an iron frame is readily repaired at a comparatively small cost, and then becomes substantially a new vessel.

I doubt not that what has been said so far relating to the purposes of our navy will be supported by the observation and experience of every one conversant with the subject, and that much more could be said of great weight in support of its necessity as a peace establishment. On so broad a subject as the best methods of attaining naval efficiency, and as to the classes of vessels and the implements required, there must necessarily be wide differences of opinion. The very many changes that have occurred in naval architecture in the past half-century are quite remarkable, and there seems to be no reason to suppose that we have reached the models and constructions that will stand the test of time, or that we now have the enginery and armaments of permanent adoption. It seems worth while for us neither to be fixed in the idea that we have reached a state of comparative permanency, nor, on the other hand, to expect to rely fully upon supposititious and untried developments of naval strength. The time of peace, however, is the time to design and test whatever seems calculated to make naval warfare formidable, destructive, and economic, remembering that nothing is economic that is not effective.

So far as the *personnel* of our navy is concerned, relatively with that of other powers, I think that we may feel satisfied. Considered physically, mentally, morally, and professionally, I think our officers are not surpassed by those of any other navy. After a careful selection

and training at the naval school, and during "practice-cruises," comes the practical instruction on board of a vessel-of-war, with its fatigues in watches, drills, labors, and experiences which teach. There is perhaps no training more calculated to give vigilance and coolness in peril than that of naval life at sea; every day brings its alarms, feigned or real; the alarm of fire, without previous warning, awakes the sleepers, and only after all of the preparations are made to extinguish it the ordinary result shows it to have been an exercise. Fierce winds sweep suddenly across the ocean, and vigilant indeed must be the officer who is not at some time "caught napping." The life is one of intelligent routine, and, at times, an earnest struggle for existence itself, and that, too, when the dangers of war do not exist. Courage is a natural quality far more common than many suppose, at least sufficient courage to do a recognized duty; but that will not suffice. That eminent divine, the Dean of Westminster, said, "Courage, self-control, discipline,—these are the gifts by which victories are won on earth." These are golden words; if they are taken to heart by our young officers we have nothing to fear afloat from the power of any adversary.

DANIEL AMMEN,
Rear-Admiral U.S.N.

THE PITTSBURG RIOTS.

THE utter inadequacy of the present militia system of the United States—to deal with the turbulent element of large cities in times of trouble—was never more painfully apparent than at Pittsburg in July, 1877. The widely-extended labor strikes culminated at this point, and for three days and nights it seemed that the rapine, plunder, and bloodshed which distinguished the Paris commune were to be repeated in the streets of one of our largest and wealthiest cities.

Why there failed to be a repetition of carnage and fire such as Thiers and Victor Hugo have portrayed, and what means may be taken to avoid, or, if not possible to avoid, to quell such disturbances as the Pittsburg riots, will be the aim of this article.

Conflicts between labor and capital threaten serious results for the future; seek to conceal them as politicians and the press may, they are but too apparent to the thinking American. The depression which for five long years has entered every channel of trade and forced thousands of working-men into idleness and want, may appear to be lifting itself from the country, and it is quite probable that for the coming ten years the supply of willing hands may not exceed the demand. But "history repeats itself," and financial disaster, ruin, and "no work" must return as certainly as the earth has its orbit, and the better we are prepared to combat such an emergency the wiser will we be.

The civil authorities at such times, either from sympathy or weakness, are powerless to act. The regular army is small, and perhaps in ten years an all-wise Congress will have reduced even that to a corps of ordnance sergeants and signal observers. The militia, or the more euphonious National Guard, must be our reliance.[1] We boast that we have half a million citizen soldiers trained in the war of the Rebellion; but, judging by the campaign at Pittsburg, the lessons which were taught them they have forgotten how to apply.

The organization of the Trainmen's Union was the direct result of an order for the reduction of wages on the part of the Pennsylvania Railroad Company, to take effect June 1, 1877. A number of roads operated by the Pennsylvania Company have their termini at Pittsburg, and this point was selected for the strike against the reduction,

[1] Vide Report of Committee on Railroad Riots.

to commence June 27, 1877. Divided counsels among the disaffected postponed the strike until July, the 19th being selected as the day on which it was to begin. On the day specified and at the time arranged the strike commenced, and in spite of the endeavors of the police, the sheriff and his posse, and nearly the entire militia of the State of Pennsylvania, the strikers—then become rioters—pillaged and burned for three days, and then ceased, not on account of resistance met, but because there was no recognized head to lead them on, and because they were gorged with plunder and drink. When they had recovered from their drunken sleep, they found a few companies of regular soldiers had arrived in the city, who, as one expressed it, "would shoot if the captain ordered them to."

All of July 19th no freight trains were allowed to leave Pittsburg either East or West, and the arrival of loaded cars soon filled and blocked miles of side-track. A description of the depots, buildings, tracks, and surroundings of the Pennsylvania Railroad property at Pittsburg is here necessary. The Union Depot was situated on Liberty Street, between Eleventh and Twelfth Streets, and from this place the line of the railroad runs eastwardly, at the foot of a steep bluff, from one hundred and fifty to two hundred feet high on the right, and with Liberty Street on the left. There were a large number of tracks running side by side out to and some distance beyond Twenty-eighth Street, with numerous switches, in order that the tracks might be used conveniently, and many of these tracks were filled with cars,—passenger and baggage cars near the depot and freight cars farther out. The outer depot, lower round-house, machine-shops, etc., were situated at and near Twenty-sixth Street, about a mile from the Union Depot. Some other shops were scattered along to Twenty-eighth Street, near which street was what was called the upper round-house. From Twenty-eighth Street down to the Union Depot the tracks were several feet higher than Liberty Street, and a strong wall was built up at the side of Liberty Street to support the embankment and to keep it from caving into the street. At Twenty-eighth Street there was a crossing much used, the bluff not being so steep nor so high as it is farther down, and the hill is ascended by a diagonal road or path from the crossing.

A little after midnight of the 19th, the sheriff, General Pearson, commanding Sixth Division of State Militia, and a small company of railroad officials, walked out from the Union Depot to Twenty-eighth Street, where the mob of strikers was most dense. The sheriff made a speech, ordering dispersion, and General Pearson followed with threatening words, announcing what might be expected if he brought his division there, only to be answered by hoots, taunts, and yells. The sheriff was satisfied that he could not raise a sufficient force to manage the strikers (although he made no effort whatever to raise a posse), who were becoming more and more turbulent from the addition of a

swarm of tramps, who had flocked from all parts on hearing of the disturbance. The sheriff then telegraphed the governor of the State for military assistance to quell the mob. At this time no depredations had been committed. The strikers who held the trains declared that the quarrel was with the railroad, not with the civil authorities. The citizens of Pittsburg, who had much to complain of in the way of freight discriminations, had no sympathy with the railroad company, but manifested an encouragement to the strikers to hold out. The adjutant-general, in the absence of the governor, telegraphed General Pearson, whose headquarters, as commander of the Sixth Division, were in Pittsburg, to assume charge of the military situation, place one regiment on duty, and, if necessary, call out his entire division. Acting accordingly, General Pearson ordered out the Eighteenth Regiment, considered the best in the division, and composed of men who wore handsome uniforms, and were of some social position and pride. Two other regiments were soon ordered out, and also Hutchinson's Battery, probably the best-drilled organization in the State. It was near 2 P.M. on the 20th before the Eighteenth Regiment was prepared to move, although orders were issued at 4 A.M. of that day to turn out. The regiment reported at the Union Depot two hundred and fifty strong, armed with Springfield breech-loading rifles and supplied with ball-cartridges.

The plan of operations then made was that the Eighteenth Regiment should move to Torrens' Station, about five miles beyond Twenty-eighth Street, and clear the tracks there, while the other two regiments and the battery should clear the tracks at Twenty-eighth Street. It was 5 P.M. before the brigade commander was ready with three or four companies to move out to Twenty-eighth Street. Before arriving there he was ordered to return to the Union Depot by General Pearson, who had become impressed with the idea that his soldiers sympathized with the mob, who were permitted without any objection by the commander himself or his subordinates to fraternize with them, move freely about and through the ranks, occasionally holding a soldier's gun while he left the ranks to visit a beer-shop. The laxity of discipline and want of authority of the officers was painfully apparent. It was palpable that the troops could have no moral effect whatever on the mob, and for war they could not be relied on. General Pearson, having gotten his soldiers and the mob promiscuously mixed and on the best of terms, telegraphed to Harrisburg requesting that two thousand troops be sent from Philadelphia to disperse the mob. The adjutant-general without delay telegraphed General Brinton, commanding the First Division of the State Militia, to get his command ready to move to Pittsburg. At 1 P.M. on the 21st, this division, six hundred strong, supplied with ammunition and two Gatling guns, arrived at Pittsburg, and the series of military blunders increased. At two o'clock on the morning of the

21st one regiment of the Sixth Division and the battery were sent out to Twenty-eighth Street, the artillery taking position at the foot of the bluff, and the infantry being posted on the hill-side overlooking the crossing. About four o'clock the same morning another regiment was stationed higher up on the hill-side. The orders given were to hold this position, and keep the tracks in the vicinity of the crossing clear of the crowd. No effort was made to carry out these orders, and it was impossible to divide the troops from the mob; they were intermingled, the arms being stacked, and many trips being taken to the beer-shops, not far away, by small parties of soldiers and strikers together. At 3 P.M. General Brinton, with his command, arrived at the Union Depot, and, after forming line, marched out in column of companies along the track to Twenty-eighth Street, accompanied by General Pearson. No advance-guard, no rear-guard, no flankers, none of the most ordinary preparations that suggest themselves to a soldier, and no plan of operation, only, as it was expressed, "to go and clean out the mob." Thus the command marched out, far into the dense crowd as possible, and then the command was given to wheel into line by the right flank, which brought the line along and parallel to the tracks and facing the bluffs. The sheriff here again appeared on the scene and ordered the crowd to disperse, only to be answered by derisive hoots and jeers. The rear rank of the line, as thus formed, had been faced about by some new tactical movement, and had marched a few paces in the new direction, leaving a distance of perhaps six yards between the ranks. The crowd forced itself down between the ranks from Twenty-eighth Street, and General Brinton ordered two companies to form at the extremities of the two lines, and at right angles with them, and to march up and down and clear the tracks. The sheriff and his deputies retired to the interior of the hollow square thus formed. General Pearson as the senior officer had up to this time been in command, but seeing the size of the crowd, went to the telegraph office near and telegraphed the adjutant-general for *more* troops. The two companies in attempting to press back the crowd carried their arms at "arms port," and endeavored to push them back. One of the brigade commanders at this juncture gave the command to load. The two companies were then ordered to charge bayonets. The arms were wrested from the soldiers' hands in some instances, and in others the bayonets taken off. While these movements were taking place, the mob were becoming more excited, defiant, and noisy, and were throwing stones and other missiles at the troops, severely injuring several. Pistol-shots were also fired, and immediately after, the troops opened a promiscuous fire, commencing at the point where the pistol-shots were fired, and extending down the line. The officers used every exertion and succeeded in soon stopping the fire.

The crowd made haste to disperse. Some twenty-five persons were

killed, and many more wounded. As is usually the case, several innocent persons, who had no business at such a place, were hit. It was soon dusk, and General Pearson, who had returned, ordered the troops to move into the round-house. At this moment a worse blunder could not have been conceived. The mob came together gradually again. The local militia were ordered to disband, which they seemed only too glad to do, in some instances turning over their arms and ammunition to the rioters. It is charitable to say that these troops were ordered to disband on account of sympathy with the rioters, and not on account of fear.

General Pearson went into the *cul-de-sac* he had made for General Brinton's command, but left to look after *provisions* before nine o'clock. Thus the command saw their commander leave them. Hearing that the mob was exasperated against him, he never returned with provisions, but hied himself away, as "his usefulness was over," as the adjutant-general afterwards expressed himself. The round-house overlooked Liberty Street on one side, and on the other were tracks, many of them filled with cars. The mob having all the opposition nicely caged, repaired to the gun-shops and provided themselves with arms, and soon after dark commenced firing on the round-house and through the windows. Two soldiers were slightly wounded during the night.

These were all the casualties of moment that had occurred up to this time. About 10 o'clock P.M. the mob began to set fire to the cars, running them down the track nearest the round-house in order, if possible, to drive out the troops, who seemed unwilling to come out unless smoked out. Thus six hundred well-armed men, supplied with ammunition, were permitted to remain besieged by the mob not one half so well armed, and cowardly, as mobs usually are when met with determination. Soon the burning cars ran down towards the round-house, but fortunately for the troops the first one had the brakes down and did not reach its destination, and stopped those behind it. No pickets or sentinels had been posted outside, and about 1 A.M. it was discovered that the mob had a field-piece on Liberty Street, ready to fire on the round-house. No attempt was made to sortie and capture it, but a few soldiers watched it from the windows, and by picking off those who approached it prevented it from being discharged. A more woeful condition could not be imagined. Blinded and suffocated by the smoke, tired and hungry from their long journey, deserted by their commander, it is no wonder that they were thoroughly demoralized. About half-past seven o'clock, Sunday morning, the 22d instant, the roof of the round-house caught fire, and it was necessary to evacuate. The two pieces of artillery were spiked, and about 8 A.M. the command moved out into the street, taking the Gatling guns. The mob scattered in every direction at sight of the troops, and no attempt was made to molest the soldiers until they began their march eastward along

Penn Avenue, a street running parallel to Liberty Street, and at right angles to Twenty-eighth Street. After marching a few squares, a shot was heard in the rear. No rear-guard, advance-guard, or flankers were out. The commanding general and his staff were at the head of the column. One shot threw the command into a panic, and it was *sauve qui peut* until the United States Arsenal was reached at Thirty-ninth Street. The arsenal is surrounded by a high stone wall surmounted by an iron picket-fence, and had for garrison twenty-two men, who protected thousands of stands of arms and hundreds of tons of powder. Major Buffington, the commandant, had taken such precautions and shown so much firmness when the mob had visited the arsenal to demand arms the previous evening, that they had concluded it was best not to attack here. Several of the fleetest runners of the soldiers managed to pass the sentinel at the closed gate. Numbers of others climbed over the picket-fence.

Major Buffington, who was just returning to his quarters from his office when he heard the sound of firing, saw several men in uniform running through the grounds. He turned and ordered them to leave. General Brinton called for protection for his troops, from this little garrison, but was ordered to take his command out of the grounds, with advice "to go into the street, form his command, and assault the mob." The wounded, one officer, was taken into the hospital and cared for, and the column, now a thoroughly disorganized command, pursued its rapid march eastward a mile and a half farther, where it went into camp. At no time on the march out were shots fired by more than three or four persons at the troops. A corporal and five men could have been detached and captured them all. Thus the city was left without any protection, and the mob held high carnival over burning cars and buildings, the citizens standing helplessly by as the pillage and destruction went on. Several cars of liquor and beer were broken open and their contents freely distributed. At this time, if the mob had been led by a man of nerve and dash, the opportunity to plunder the banks and private dwellings would have been seized. The city was paralyzed and powerless, and its citizens may congratulate themselves that there was enough whisky and beer for all. A strange feature of the riots at Pittsburg was that no acknowledged leader appeared. The mob seemed to act on each separate personal impulse, and at no time by the advice and guidance of any one man. Even a weak sheriff with half a dozen helpless deputies no longer confronted the excited mob. A mayor arrogant and selfish sat idle in his office, and issued a proclamation. A few citizens here and there agreed in low whispers that this might hurt Pittsburg. On the morning when the devastation began, scarce one man in a thousand could be found who dared make open protest. The morning papers on Sunday encouraged it, and many citizens applauded.

On Monday, a few regular troops—artillery from the East, under command of Major John Hamilton, First Artillery—arrived, after which there was no longer any mob. The undress uniform of the regular troops at once inspired confidence on the part of the citizens, where the handsome, full-dress uniforms of the State troops had only been objects of scorn and derision. The rioters had either fled or were concealed, and bravery was at its highest pitch.

An instance of the thorough demoralization of General Brinton's command was shown at the arsenal on Sunday morning. The commandant had directed the hospital steward to take all wounded men that were brought in, to the hospital. A short time after the flying column had passed, he visited the hospital to assure himself that the wounded were being properly cared for. He found one bed occupied by an officer fatally wounded, and six others by soldiers whose injuries were yet unknown. He called on the occupant of the first bed—a soldier on whose coat were sergeant's chevrons—to learn where he was wounded. A look satisfied him that the man was unhurt, and ordering him to get up and out of there in strong language, the fatally injured six men arose from their couches of pain and walked forth healed and well again, such power to raise the sick and maimed had the major's words. The detachment of twenty-two men at the arsenal had been prepared to meet the anticipated attack, and the firmness of the commandant in the face of the mob probably saved from destruction and the rioters millions of property and arms. Had the commanding officer of the militia at Twenty-eighth Street the sagacity to take advantage of the situation either Saturday evening, after the mob had fled from the firing, or on Sunday morning, when the troops evacuated the round-house and the mob was again dispersed, the result might have been quite different, and at least $3,000,000 of property saved from destruction, that some one has yet to pay for.

Pittsburg, in July, 1877, is only another example of the disaffection of the soldiers who are citizens and cannot be separated from sympathy or prejudice, and whose discipline depends on their own inclinations more than on the will of officers whom their suffrages elect to command them. It is doubtful if any system can be devised in America by which soldiers, in any numbers, can be made, except in schools of the regular army, to successfully deal with the strikes and riots which all labor communities must pass through. And with the rise and growth of communistic sentiments among the lower classes the day will come, and some of us may live to see it, when we will have learned that it would have been better economy to have had a larger regular army, which is now and always will be the guardian of our boasted republican institutions.

THOMAS B. NICHOLS.

A LAY SERMON—ARMORED VESSELS.

"No pleasure is comparable to the standing upon the vantage-ground of truth."
—*Bacon's Essays, I. Edition*, 1625.

THIRTY-THREE years since, J. Fenimore Cooper, in the last edition of the Naval History which he had so zealously compiled and corrected, declared, with exultant national pride, that our navy "can now bring its fleet into line and exercise a most essential influence on the result of any conflict. As respects the navies of this hemisphere it is supreme; the united marines of all the rest of this continent being unable to contend against it for an hour. As respects the three great maritime states of Europe, *though inferior to each in vessels, it can scarcely be called inferior to more than one in resources*, while in skill, character, and hopes it is second to no other service on earth."

In the present year of grace, Admiral Porter, writing of the same branch of service in the initial number of this Review, emphasizes as an unquestioned fact that our navy "has dwindled away to a trifling number of vessels, and even of these reports do not speak well, and while we boast superiority to Great Britain in the material products of our country, . . . we show no capacity whatever to protect our growing interests, *which lie at the mercy of any freebooting country that may choose to assail them.*"

In both quotations the italics are my own; but as these are the frank opinions of men qualified to speak authoritatively upon the subject, their conclusions are as unassailable upon any grounds worthy the attention of thinking minds as they are fraught with reproaches, that should burn as coals upon the lips of those who advocate the degradation of the nation.

It is useless to formulate the causes which have produced these ill-starred effects, for they run the gamut of human ignorance and folly; thirty years since sharp lessons of adversity made the necessity of the navy axiomatic, materially from the commercial demands of the country, sentimentally by the promptings of that pride and humanity which characterize enlightened civilizations and evidence the progress of modern thought. To-day we are given over, actually, if not confessedly, to the limitations of the Universal Peace Societies, and with Ar-

cadian mildness sit under the covert of full-spread beech-trees, listening to Corydon and Thyrsis practicing woodland lays of peace on slender oaten pipes, wax-jointed and well-notched.

Europe defiant, and with hand of steel in glove of velvet, thinks differently, and lingers anxiously at the other pole of thought, while dock-yards ring and the clank and mastery of iron awaken echoes that still the pleadings of the rural, peaceful pipe. The special boasts and defenses of the insular and coast-bound nations are now the shibboleths of other countries whose sea-boards are limited, and whose aptitude for marine warfare has been in the past a matter more of sentiment than of fact. The world reverberates with the war of iron,—of guns and vessels, of armor and of armament,—save in that pulsing, intensified furnace of human thought and activity, where all these vexed questions were first wrought; for America, the maker of the problems, leaves to others their solution.

There can be no question of the importance of a thoroughly-built and equipped fleet to an isolated maritime country like England, anchored on the edge of a continent, intrusted with the care of world-wide interests, and charged to maintain its power at a time when the spirit of invention is setting at naught all past systems of ocean warfare, and mocking at every heritage and tradition of the time when she won her naval renown. France and Russia, with their extensive sea-boards, and Turkey, saved from dissolution by her fleet, are all keenly alive to the necessities of the hour; Italy, crystallized into homogeneity, strives with the instincts of new life for an honorable place in the councils of the nations; and Germany, zealous for every advantage blood and iron can yield, is advancing in such a ratio that in ten years she has created a fleet superior to our own, and inferior only to those of England, France, or Russia.

A review of the comparative status of the lesser powers shows their great advance in the last decade, and when we see Cathay, the outer barbarian, striving for a place in the race for which we are not entered, then it is time for reflecting men to ask where we are tending. The naval service seems to possess the same interests for the nation at large as do the estimates for the Irrigation of the Irriwaddy, or a new reading of the Imitations of Ausonius, and on no other subject is there such an absolute want of positive thought, of negative information even; nor can this criminal neglect be altogether explained, primarily upon the absence of an apology for a fleet, or as corollary, by the proverbial ingratitude of the republic towards the institution that it celebrates in song and neglects in appropriation. Abroad, attention is called to the subject by discussions which make it a part of the national existence, and these countries, these effete monarchies we are always about to annex, thrill with earnest arguments, exhaustive legislative inquiries, and keen and intelligent press criticism. In England especially, the

liveliest interest is taken in all that relates to the fleet, and the estimates and proposals, the anxieties and explanations of the Admiralty are scanned and criticised so closely, and on the whole so intelligently for legislators, as to cause their discussion to engross a large share of the excitement of a session and to endanger the fate of cabinets. With us in peace times, when our bruiséd arms are by no means hung up for monuments, the navy, so far as national interest goes, is conspicuous only by the utter neglect that Congress shows for it, save in threats to reduce it to a lower plane; a calm retrospect of its deeds in the past soothes the pensive and post-prandial mind, and the reproaches of the men who suffer most by the general neglect are stilled with lofty predictions of its assured success in necessity; the question is taken from the domain of conscientious examination and relegated to a fairy region where "its unvarying history," "the logic of its sublimed past," "its self-creative and latent power," float airily—nimbus-circled and star-endowered—above the sober realms of fact. The truth is, what the navy has done in its past has been not in consequence, but in spite of the national spirit.

Fourteen years ago, at the close of our civil war, we occupied the first place, behind us deeds the wondering world declared unrivaled, and before us opportunities that broadened into avenues of assured supremacy; to-day, at the very best, we are at the low-water level of Peru and Denmark, a little higher than Japan perhaps, but far below the modest horizons of Italy and Brazil. It does not require any profound knowledge to understand this retrogression, this material and re-active moral decay, for it is politics! politics! politics! in an increasing radius of destructive effect. On paper our fleet is very fair, but when subjected to analysis, its real effectiveness becomes patent to experts, notably to that persistent body of *attachés* who are among us hopelessly taking notes not worth the printing.

Some good thing, however, has come out of Nazareth, for the duties our national conscience imposes are fortunately lightened by results foreign navies have arrived at empirically, and at an outlay which our inaction has saved. But now that many problems are solved, the question of types fairly settled, and the line of demarkation between illimitable armor and equally illimitable armament defined, we should wed experience and invention, policy and information, and assume the place our pretensions warrant.

What is our position, actually and relatively? Something very nearly like this, which read and digest, and then let us in sundry places, oh, dearly beloved brethren of brag, bluster, and buncombe! let us hide our diminished heads.

According to the classification of Dislére, armored vessels are arranged in four divisions, not of types, but of rates, a distinction which must be clearly remembered.

1st. Ships of the line, or line-of-battle ships (*navires d'escadre*).
2d. Ordinary cruising ships (*navires de station*).
3d. Coast defense ships.
4th. Iron-cased batteries and gunboats for service on lakes, etc.

In the admirable translation of "La Marine Cuirasée," by Commander Richard Meade, U.S.N., this order of classification is adopted, and under it are tabulated the construction, cost, armament, armor, and motive-power of the different rates. The English Admiralty adopt another standard, in many ways more specific; but until an international, or at least a rigorous definition is recognized, that of Dislére must serve the general reader. Chief Engineer King, U. S. Navy, in the excellent report from which many of these facts are excerpted, assumes the English classification to be the best, and divides the effective force of that navy into, 1st, ships for great naval battles; 2d, ships for coast defense; and, 3d, unarmored cruising vessels. However desirable this may be, it is impossible to employ it now as a means even of superficial comparison.

In the table below the summation includes all ships built or projected to the date of publication of Dislére's work, and to this, from later sources, have been added ships recently launched, or in such an advanced stage of completion as to warrant their admission. In justice to the scope and limits of this paper, it must be understood no efforts are made to present the subject in a purely technical light; and as this is an appeal,—the airing of a grievance to an unprofessional *clientelle*, and not to officers who know the merits of the discussion,—it has been deemed best to submit the unpalatable facts in a practical way; what the average book-maker and literary hack euphemizes as "the popular form," which, I take it, is a protest against any but the plainest sailing, with no explorations of the esoteric regions of theoretical ship-building, nor airy triflings with the nebulous domain of the diaphanous calculus. In the aggregations given, the magnificent line-of-battle ships of England, eighteen in number, and of two general types, are put upon an equality with other vessels, British and foreign, which they outrival; and in the somewhat arbitrary distribution of our modest squadron some vessels, yet unlaunched, are assumed worthy of a place, and the division of classes has been made to correspond with that of Dislére; some of these are unfair assumptions, perhaps, but are inevitable, and due to the want of exact classification; to silence any caviling, nothing has been taken from the advantages our ships can present; on the contrary, they have been relegated to places to which they would have, in exact and pure reasoning, no claims. The table includes the number of ships in each class, their total number and gross tonnage, together with the total armament, and what I venture to call the gun ratio of each nation.

Nations.	Line-of-Battle Ships, 1st Class.	Ordinary Cruising Ships, 2d Class.	Ships for Coast Defense.	Ships for Lakes and Rivers.	Total No. of Ships.	Gross Tonnage.	No. of Guns.	Gun Ratio.
England	34	9	16	...	59	317,000	698	28.8
France	22	11	15	5	53	184,000	472	18.0
Russia	6	2	21	...	29	89,000	179	7.0
Turkey	8	7	4	5	24	65,000	137	5.0
United States	...	...	10	14	24	24,000	72	2.8
Italy	8	7	1	...	16	55,000	199	8.0
Brazil	2	10	2	6	20	.....	88	3.4
Sweden and Norway	...	...	10	10	20	.....	31	1.2
Holland	...	2	15	1	18	23,000	57	2.2
Austria	10	2	2	...	14	58,000	138	5.0
Germany	8	3	2	...	13	60,000	160	6.3
Spain	8	1	...	2	11	.....	164	6.3
Peru	1	2	4	...	7	11,000	45	1.76
Denmark	3	...	3	...	6	.....	68	2.6
Chili	...	...	2	...	2	.....	12	0.47
Japan	...	1	1	...	2	.....	17	0.66
Greece	1	...	...	...	1	.....	14	0.55
Total	111	57	108	43	319	.....	2551	99.

Of the three hundred and nineteen ships of all classes, two hundred and sixty-four are in the navies of Europe and fifty-five in the services of North and South America and of Japan; England, with nearly one-fourth, France with one-fifth, and Russia and Turkey with about one-twelfth each, possess over half the effective force. The United States makes numerically a respectable display; but this sop to Cerberus, this is the fleet of campaign documents, and in actual number and efficiency we are much lower. The monitor or turret is the dominant type, divided into three classes; but it is probable the seven most powerful exemplars of this system in the British navy are alone equal to the combined forces of any one of the four other great naval powers. The tonnage is as nearly correct as careful gleanings of official documents permitted, and here the standing of the four nations is relatively preserved; America, however, with but twenty-four thousand tons, falls to the eighth place, illustrating the pitiful character of the ships, for with twenty-four vessels our navy is surpassed by Germany, Italy, and Austria, with thirteen, fourteen, and sixteen vessels only.

The correlation of mercantile and naval tonnage is of the nature of good and stable government, and is a symptom of vital importance in the diagnosis of national health. In no other one way is our armed force rendered more contemptible. I have chosen the statistics of 1876 as affording the best comparison with any accurate information from naval sources, and, as I believe, more in accordance with the data which must be logically employed.

Nations.	Sailing.		Steam.		Total.		Ratio of Merchant Tonnage to Naval.
	No. of Ships.	Tonnage.	No. of Ships.	Tonnage.	Ships.	Tonnage.	
Great Britain (and Colonies)	20,265	5,807,365	3,299	3,362,992	23,560	9,170,357	28.00
United States	7,288	2,390,521	605	789,728	7,893	3,180,249	132.50
Norwegian	4,749	1,410,903	122	55,874	4,871	1,466,777	.....
Italian	4,601	1,292,076	114	97,582	4,715	1,389,658	25.25
German	3,456	875,995	226	226,888	3,682	1,102,853	18.36
French	3,858	725,048	314	334,334	4,172	1,059,382	5.75
Spanish	2,915	557,320	230	176,250	3,145	733,570	.....
Greek	2,121	426,905	11	7,133	2,132	434,038	.....
Dutch	1,432	399,993	126	134,600	1,558	534,593	23.21
Swedish	2,121	399,128	219	88,660	2,140	487,788	.....
Russian	1,785	391,952	151	105,962	1,936	497,914	5.58
Austrian	983	338,684	78	81,269	1,061	419,953	7.24
Danish	1,348	188,953	87	60,697	1,435	249,650	.....

England protects her flag by one ton of armored vessel to every twenty-eight of merchant, without considering her large fleet of modern-built, iron, composite, and effective wooden steamers,—in all a navy of nine hundred thousand tons. America shields one hundred and thirty-two tons of merchant vessels with one ton of man-of-war, that never leaves the coast, and with no modern-built, iron, composite, or wooden steamers worthy the demands the commercial interests may at any time make. All of the other nations quoted have serviceable unarmored vessels; and France, especially, has a fleet building or projected that will in a few years make her commerce the best protected in the world.

The number of guns in armored vessel is 2551, of which the line-of-battle ships mount 1631, or an average of 14.80; the cruisers 385, an average of 6.75; the coast defense ships 479, an average of 4.41; and the lake and river batteries 56, an average of 1.30. This analysis shows England to have a relatively greater proportion of guns than ships, or very nearly 28 per cent. Our government insists upon national rights with 2.8 per cent., or about one gun afloat for every ten upon English decks. For every American gun France has seven, Russia three, Turkey two, Spain nearly two, and modest, unassuming Denmark, with no seeming mission save to give charming wives to reigning houses, has gun for gun. Five years ago we were to emulate a gentleman of the Hannibal Chollop (Esq.) kidney, and to dive deeper, come up drier, and swim farther with one hand tied behind our backs than any other nation,—than Spain especially. Could we have done so five years since?

This relative proportion of guns is more to our discredit when the destructive effect and penetrating power of improved modern artillery are considered, and it would be a part of the generous policy of charity to be silent upon our shortcomings, did not foreign governments and their agents, accredited and unaccredited, know them so well.

The best naval gun we have is the 15-inch Dahlgren smooth-bore,—the rifled cannon of the "Trenton" and the 20-inch smooth-bores of the unlaunched "Colossus" being out of the question. The Chief of

Ordnance long since recommended to Congress the adoption of a new system, and proposed "the entire re-armament of the navy with breech-loading rifle-cannons"; and he further asserted, "the sphere of offense of the monitors does not extend beyond 500 yards, which might be increased to 3500 yards by the substitution of an efficient rifle of the same weight (calibre 10 or 11 inches) for the 15-inch smooth-bore." This means, a spherical shell or shot of 450 pounds is not effective against the ordinary cruising iron vessels (5½ or 6 inches side-plating) beyond that range, and that it is perfectly harmless upon ships of the "*Devastation*" *class at any range.* Fourteen years' experimenting abroad has taught a different lesson, and the guns now carried in cruising ships, even, make any comparisons seem absurd.

The British navy is supplied with muzzle-loading rifled cannon, beginning with 6½-ton guns, and increasing through the calibres of 12-, 18-, 25-, 35-, and 38-ton guns, until its armament culminates in an actual 81-ton gun, with a projected 160-ton gun for the future. The 81-ton gun is 27 feet in length over all, 24 feet length of bore, and of 16 inches calibre, and with a service charge of 370 pounds and a projectile of 1700 pounds (initial velocity 1520 feet) has produced an energy of 27,200 foot-tons, or 540 foot-tons per inch of circumference. During the first trial, in September, 1875, at Woolwich, with an experimental calibre of 14½ inches, a 230-pound charge and a 1260-pound projectile, it developed an energy of 20,400 foot-tons, or about the estimated force with which the prow of the "Iron Duke" encountered the "Vanguard."

These results have since been exceeded. The Italian government proposes arming the turret line-of-battle ships "Dandolo" and "Duilo" with four 100-ton guns each, and two at least have already been completed at the Elswick works of Sir William Armstrong, Newcastle-on-Tyne. The extreme length of these cannons is 32 feet 10½ inches; the length of bore 30 feet 6 inches, and the calibre 17 inches; the exterior diameter varies from 6 feet 5 inches at the breech to 2 feet 5 inches at the muzzle. They are built-up guns on the Armstrong principle, and the steel barrel is 31 feet 3 inches long, and decreases from 6 inches at the powder-chamber to 3½ inches at the muzzle. In the first trials, the charges varied from 300 to 341.6 pounds of powder, and the projectile was a studded rifle-bolt weighing 2000 pounds. As the result of these conditions there was achieved an initial velocity of 1543 feet, with an energy of 33,000 foot-tons, or 623 foot-tons per inch of circumference, a better showing than the limits of the trial of the 81-ton gun at Shoeburyness, in February, 1877, as quoted above.

In the target trials of the English M. L. R. 38-ton guns, the projectile went neatly and fairly through 18 inches of iron and 12 of teak, or 30 inches in all; and at another firing the bolt penetrated a shield of 22 inches of iron and 6 inches of teak, until it was embedded in the last plate. At a range of 70 yards, a projectile of 812 pounds, with 130

pounds of 1-inch pebble powder, was tried against a target built up of 19½ inches of iron, in three 6½-inch plates, separated by two 5-inch backings of teak (the live-oak of India), or 29½ inches in all. The report says it punched "a clean hole, 13½ inches by 12½ inches, in the two front plates, and penetrated into the rear plate, where it broke up."

The 81-ton guns were tried against the "Inflexible" target, which was built of "four iron armor plates, each 8 inches thick, sandwiched between three layers of teak each 5 inches thick, amounting in all to 32 inches of iron and 15 inches of teak;" and with 370 pounds of powder, a Palliser projectile, filled with sand until it weighed 1700 pounds in all, "penetrafed through 24 inches of iron and 15 inches of teak-wood, and was arrested with the point 1 inch into the fourth plate, thus leaving 7 inches of iron in front of it unpierced, which iron being cracked and bent would offer greatly diminished resistance to further penetration; the projectile itself being split." (*King on European Vessels.*)

The results of the 38-ton and 81-ton guns naturally excite inquiry of the possibilities of the 100-ton Italian, and still more of the English 160-ton guns, these last being so little a question of time, that the turret-ship "Inflexible" has been designed with a view to their employment.

Granting that we had as good guns, the defensive power of our ships would be unequal to their offensive, and lacking gun platforms the guns would be useless. The "Inflexible," however, is more than equal to such demands; she is an iron citadel with two turrets, and, with a displacement of 11,407 tons, is to be driven at a speed of fourteen knots by twin screws. Her vital parts are plated *with* 24 *inches of iron*, and, except in piping times of peace, she is to be brig rigged; her length between perpendiculars is 320 feet, and her breadth 75 feet at the water-line, with a mean draught of 24 feet 5 inches. We can institute no comparisons with her nor with the two Italian vessels, which are 339 feet in length, 64 feet abeam, double-turreted, and of 10,650 English tons displacement at a mean draught of 25 feet 11 inches. However, the relative armament, plating, and resisting power of three national vessels are given below, the power of resistance being taken with the French ship "Gloire" as the standard or unit 100.

Vessels.	Armament.	Side Armor.			Turret and Armor.				
		Sides.	Backing.	Power of Resistance.	No. of Turrets.	Diameter.	Thickness.	Backing.	Power of Resistance.
						Ft. in.			
United States, "Miantonomah."	Four 15-inch smooth-bore.	6	27.56	69	2	24 7	10	.....	170
England, "Devastation."	Four 12-inch 35-ton rifle.	12×1½	18.	336	2	31 0	14×1½	14.41	392
Germany, "Borussia."	Four 10.24-inch and two 2.67-inch Krupp rifle.	9½×1¼	8.46	237	2	26 9	8¼×1¼	8¼	221

The armor of the United States vessels is laminated, not of choice, as it is the weaker form, but of the necessity that, until the year 1870, we had no works in this country capable of rolling plates over 4 inches thick; in England, within reasonable limits, plates can be rolled to meet any demands of naval architects, the turret walls of the "Inflexible," for instance, being "formed of a single thickness of 18 inches, by far the thickest plate ever manufactured, with the exception of the 22-inch experimental plate, which was rolled . . . for the turrets of the Italian frigates."

This will explain the discrepancy in the table, for in practice it was found the resistance of laminated armor did *not* vary as the square of the thickness,—the formula which obtains with solid plates. The "Devastation," with 12 inches of side-armor and 18 inches of teak backing, has nearly five times the resisting power of the "Miantonomah," with 6 inches of iron and 27 of wood; and nearly three times the resistance ratio of the "Colossus,"—not tabulated,—with 8 inches of iron and 27 of wood. With regard to the relative steaming power of monitors and their economy of fuel, a comparison has been made between the "Devastation" and the "Miantonomah," though it is but fair to say the "Dictator" is the better steamer. Still, the speed assumed is the maximum, and far above the golden mean that would be secured in line of battle, for, as a matter of fact, the signaled rate of steaming in the Key West drills was of necessity four knots.

Vessels.	Area of Heating Surface. Sq. feet.	Propeller.	Steam-pressure in Lbs.	Revolutions per Minute.	Power developed Horse-power.	Maximum Speed. Knots.	Consumption of Fuel per Hour and per Horse-power. Lbs.
United States, "Miantonomah."	9,365	2 screws	19.77	60.00	632	8.00	7.25 (?)
Great Britain, "Devastation."	18,730	2 screws	22.00	76.94	6,648	13.82	3.42

Briefly, it may be said that foreign-armored vessels can steam farther and more economically than our own; are better built and equipped; can select their position for engagement, and at a distance where no shot of ours can reach them; can sink the best ships we have, and are impregnable, even within the ranges of the best American guns. We have few ships and many useless guns, and this with a mercantile tonnage the second in the world. Our ships cannot engage forts nor silence them; cannot resist projectiles of any ordinary kind, nor meet the enemy under the varying conditions naval warfare imposes; they are not fast enough to choose the time or place of action, nor can they carry coals or stores, nor transport troops to any ocean; they are not fitted with penetrative nor crushing ram-power, nor can they impress the heathen, for they cannot get to him.

It is possible the pensive and post-prandial mind, undisturbed in its optimistic dream, may here suggest "torpedoes" as the unanswerable and relevant middle-term for the syllogism it is too languid to formulate. For defensive purposes—yes; but I doubt if there is in the world an absolutely reliable and effective offensive torpedo; no experiments have discovered it, and while every nation's duty is to find this perfect weapon, yet it appears to be as illusive as any other attempt to overcome the economy of nature; so far torpedoes seem to be things of beauty and experiments forever, not Gradgrind facts.

Nor can the resources of the nation be developed in an emergency to satisfy these wants. This is the great fallacy, the cardinal principle of evil which has so prostituted the national spirit, that a foolish, egotistical dependence upon its assumed truth bids fair to wreck our pride and hope. We need everything, experience, plant, metal,—everything material, and it is a question if an expenditure of two millions of dollars and two years of intelligent study would enable us either to roll large iron plates or to produce the steel necessary for guns. Commodore Simpson says, "If we ever expect to be possessed of guns that will perform the primary work of artillery, which is called for by the character of the defenses of the present day, we must have an unlimited supply of steel, such steel as cannot now be produced in this country, and a knowledge of the manufacture of which can only be acquired by an extensive series of experiments."

We are now at a turning-point in the history of our navy, and if Congress will legislate wisely for it, the service may enter upon a future full of interest and promise. In the beginning we gave the accepted type to the world, and in that future what limitations can we predicate for the ingenuity of our countrymen! No revolution of modern days was more sudden, more complete, than that following the battle of the "Monitor" and the "Merrimac," and the reports of those opposing guns awoke echoes that ring out, with deadly significance and with potent lessons even to our days, from busy dock-yards over the feverish world. The solemn night that fell after the retreat of the "Merrimac" shut out forever the age of wooden walls, and with the dawn the sun of a new era shone on nations whose bulwarks were swept from the sea, and revealed the age of iron, full-armed, like Minerva of old, waiting for the conflict. Iron and steel became the unknown x and y's of the problems that vexed men's brains, and only in powder and shot could be found the solution of the new equations. There had been ironclads before, for batteries had done yeoman service in the Crimea; but the cool, phlegmatic scientific world waited for railroad iron and laminated plates, for angled casemates and revolving turrets; those mutually inoperative shells and rifle-bolts supplied the data, and, with the zeal of men who find a laborer worthy of their hire, the peacemakers of the two continents buckled to the work before them. America accepted the

inspiration as God-given, pinned her faith upon a type and a theory—monitors and smooth-bore guns with racking charges,—and loyally, though in opposition to her national characteristics, became conservative; no persuasion could move her, for here was an exemplar of that eternal fitness which produces the remedy for the disease at the mathematically exact stage; here the consummation of a divine design, long and aimlessly drifting through the brain of that king of iron-factors, Ericsson, and realized at a time when the nation's need was sorest. Europe progressed; conservatism was consigned to that region of respectability where it best flourishes, and the wild hypotheses of iron maniacs, as the papers dubbed them, found realizations that made the decade a time of miracles and of wonders returned. In 1863, the man whose audacity prophesied the "Inflexible," with a monitor, as the impregnable acmé, before him, would have been drawn and quartered, —with pen and ink,—and made to feel that every respectable plodder and dull apprentice had the right to question his sanity. The question was as embittered as it was sudden, and in its advocacy and opposition, —as the majority of the disputants were naval men,—the pet arguments, positive assertion and flat contradiction, filled the laboring columns of the undelivered newspapers. The question of expediency settled, then followed the war of types, waged long and hotly, and, to be exact, not yet settled. The inherent advantages of the turret system were so manifest, however, that no opposition nor temporary misfortune could overcome its claims, though the unrestrained method of advocacy retarded its advancement. All nations have adopted it except France, and it is only a question of time before her fleets will be composed mainly of high-free-boarded, citadel turret ships. In the race between guns and plates, armament seems to have won, for in the construction of the "Inflexible," the best English authority says, the extreme limit in thickness of armor (twenty-four inches in two plates) has been reached. Sir William Armstrong claimed ten years ago that an illimitable gun would finally get ahead of a limitable armor, and armored vessels would become antiquated; but in opposition, Reed says, "The abandonment of armor is advocated upon the ground that it is incapable of resisting the heavy projectiles that can now be fired from naval guns. . . . I assert with confidence that as the 'Hercules' is at this moment (1870) impregnable in the region of the water-line to the attack of any and every gun afloat in any part of the world, so the ships of the future may in like manner be endowed with a like impregnability against the guns of the future; and my conviction is that before armor ceases to be superseded as a defense against guns, guns themselves will be superseded as a means of attack. The ship itself, viewed as a steam projectile, possessing all the force of the most powerful shot, combined with the power of striking in various directions, will be deemed the most formidable weapon of attack that man's ingenuity has devised."

However much we, who will suffer by the nation's supineness, must chafe at this inaction, yet we have the soothing maxims of philosophy, the calm retreats of sentiment, for consolation; like choric singers, propped on beds of amaranth and moly, we can dreamily watch these others suffering endless anguish, with no hope of asphodel, and satisfy our inner spirits with that echo of Lotos lands,—"There is no joy but calm!" We have no policy as we have no ships, unless the matchless plan, how-not-to-do-it, be as potent here as in the Hades of red-tape and indorsement. We are forced to inglorious idleness, and must watch the strife much as the fasces-guarded gladiators gazed upon the ring where once, as victors, they hailed imperious Cæsar.

England and France yearly build a number of tons to compensate the waste and destruction, and Germany, since the adoption of the plan of 1873, has done wonders. Italy has made grand strides in commerce, but in her efforts at naval effectiveness has outstripped her own marvelous record in the merchant marine. We need turret ships of the most improved type; cruisers to bring credit and enforce respect abroad; dock-yards thrilling with the labor of persistent effort that makes skilled artisans and designers; squadrons enabling our officers to learn the duties of their profession and yielding a golden wedding of theory and practice; rifle ordnance, permitting the mournful satisfaction of the school-boy,—the privilege of hitting back at least,—and, O conscript Fathers! a coherent, common-sense system of administration to control the general working of the navy, while individually each branch carries to the intended extent its special duties.

With a *personnel* unsurpassed by any other service, we have in *materiel* absolutely no navy. Will the nation create one?

J. D. J. Kelley,
Lieutenant U.S.N.

MILITARY RIFLE PRACTICE IN THE UNITED STATES.

UNTIL within a few years no effort appears to have been made to instruct American soldiers to use their rifles with accuracy. To march like a wall, to wheel with an unbroken front, and to perform the manual of arms with precision was all that was required. Foreign countries had for years had their special schools of musketry. Ranges where military shooting under all circumstances and at all distances was carefully practiced were numerous, and the result of the rifle practice of the English volunteers, not only at Wimbledon, but at the many ranges existing throughout the provinces of Great Britain, was well known to us. It was not until 1873 that any practical step was taken to teach our troops how to shoot. This was too soon, for although Americans generally had the idea that we were a nation of sharpshooters, the fact was that our people as a mass knew little about shooting, and nothing in regard to shooting at modern ranges. Rapid as the progress has been since that date, it is still confined within comparatively a small area. In the army, through the false economy of Congress, it has, until the past year, been sadly neglected, and in most of the States many National Guardsmen still serve years without firing a shot, although carefully instructed to perform the motions of the manual of arms.

Outside of the States of New York, Connecticut, and New Jersey, I believe there are none where instruction in rifle practice is regarded as an indispensable part of a soldier's drill, and every National Guardsman is required to shoot through a prescribed course.

The success that has been obtained in these three States since they took up the subject has been great. In New York, the marksmen have risen from five hundred and thirty-three in 1875, to three thousand and fifty-nine in 1878, the qualifications in the last year having also been made more difficult by abolishing the sighting shots formerly allowed.

The ranges have increased from one in 1875 to thirty in 1878, and while in 1875 the strength of all the organizations who performed class practice was seven thousand six hundred and seventy, in 1878 it was

seventeen thousand six hundred and twenty-three, being practically all except the artillery.

What was once felt as an onerous duty, objected to by many officers and disliked by the men, is now popular, and the keenness of the emulation between the different regiments for a high "figure of merit" is only equaled by that existing between their members to secure a high score for the "marksman's badge," and to win a prize in some well-known match.

It is scarcely necessary to say that the result has been extremely valuable in a military sense. The men are not only more formidable as soldiers, but they have gained a confidence in themselves which makes them fearless.

They know just what they can do with their breech-loaders, and consequently stand in no awe of a mob or troops who cannot shoot. On the other hand, mobs and rioters are found to entertain a most wholesome respect for their skill.

New York being first in the field and having the largest force, probably can show the best results in this respect; but the general instruction of her National Guard is probably not superior to that of Connecticut, and certainly she can show no better individual shots than the latter. New Jersey has made great strides during the past year, and will soon be equal to either New York or Connecticut.

Several of the other States, and notably California and Louisiana, have many superior shots among their National Guard; but they have not as yet begun teaching them all to shoot as they do to drill, and until this is done they cannot be considered instructed.

The instruction of the New York troops having been carried on systematically upon a large scale and for several years, it may not be too much to cite her experience as an example to other States about to take up the subject of rifle practice, the more so as it has been followed by Connecticut and New Jersey.

With a liberal Legislature, an adjutant-general heartily in sympathy with the idea, and a National Guard twenty thousand strong, every opportunity has been afforded for the trial of experiments and for the development of a harmonious system. Of course mistakes have been made. Many plans have been tried and abandoned. But the result has been to settle upon a plan, which is now found to work smoothly and to give good results, and which is believed to be generally satisfactory.

The experience of New York is that inspectors of rifle practice are indispensable. Rifle practice is full of detail, and requires in each organization a special officer of practical experience to look after it. Commanding officers, and particularly regimental commanders, are too much occupied with their other duties to learn or enforce a new system. Unless they can have a staff officer to whom they can commit it, it will not be attended to.

The general inspector upon the general staff, and the division, brigade, and regimental inspectors, insure uniformity of practice and proper supervision. The regimental inspectors instruct and aid the company officers, instruct the recruits, supervise the regimental practice, select the team, make out the reports, and generally keep alive the rifle practice of their regiment. Next to the adjutant they have probably more to do than any other officer in the regiment, and its standing as a shooting organization depends largely upon their ability and industry. It is not intended that they shall exercise any command over the troops themselves. The commanders are responsible for the instruction of their men in shooting as in everything else. The inspector's duty is to see that this is properly done, and that the articles they need are ready for them.

When upon the range the inspectors assign the target-scorers, markers, and generally direct the manner in which the shooting is to be carried out. They have nothing to do with the movements of the troops, the guards, or the general discipline, which is controlled by the commanding officer.

The inspectors are usually selected from the best shots in an organization, and generally are exceptionally good officers, enthusiastic, energetic, and thoroughly familiar with their duties. I consider that the success which rifle practice has attained in my own State is largely owing to the assistance I have received at their hands.

The fundamental principle of rifle practice is that it is a matter of instruction to be taught in the drill-room; that the range is more to test what has been so taught than a place of instruction. Only experience will convince officers that this is correct. The natural inclination of all is to obtain the largest possible allowance of ammunition, to spend as many days as possible on the range, and to neglect the steady, systematic armory drill which is necessary to properly instruct their men. In training a team, undoubtedly actual practice upon the range is necessary to enable men to acquire a knowledge of elevations and the allowance required to be made for wind; but even with them much more ammunition is usually expended than is necessary. In firing from the shoulder, constant practice in aiming drill will give the men almost as good a command over their weapons and a union between the eye and the hand as actual firing.

In kneeling, the difficulty is almost entirely one of position. Unless regularly drilled, even a good shot makes a poor score in this position, while a poor shot, who is at home in it, will make a good one. So, also, accuracy in firing when lying down can only be secured by one accustomed to the position. Aiming drill should always be supplemented by indicator practice.

The "indicator" is a square steel rod like a foil blade inserted in the rifle-barrel, the forward end passing through a brass tompion and

the butt being inserted in a wooden cylinder loosely fitting the bore. The fall of the hammer (which strikes a heavier blow than is usually known) drives the firing-pin against the butt of the indicator with force sufficient to throw the rod some twenty inches out of the barrel. The forward end is armed with a pin, bent so as to be in a line with the sights, and which when the rod is thrown out of the barrel in firing is carried along in the "line of sight" (the tompion and wooden butt serving as guides), and punches a hole in a miniature card-target placed twelve to fifteen inches from the muzzle as a bullet would do upon a real target. New York has two thousand of these in use, and a number more are in use in other States and in the regular army, particularly at Fort Leavenworth.

It was invented as a substitute for candle practice, and as its results are positive, has superseded it entirely. It can be used in any rifle having a hammer. Rifles like the Sharp or Peabody-Martini cannot use it unless a special spring is provided.

A good shot can keep up his skill by aiming drill alone, as he can tell by his sights whether his aim was deflected when the hammer fell. But an inexperienced man cannot do this, and needs something to show him what he is doing, and whether he is shooting better or worse than his comrades,—and as the indicator enables him to do this, he prefers it to aiming drill, which he is apt to find monotonous.

As it costs nothing to use, makes no noise or smoke, can be used by an entire company at once, and permits of a close supervision of the practice of each man by his officers, they find it to be valuable as a method of instruction.

Armory rifle-galleries are useful, more perhaps in exciting emulation and accustoming officers and men to the details of actual firing than for instruction, on account of the time they require. There are but few armories that have more than two to three targets.

Estimating at a shot a minute (the usual allowance), it will be seen that twenty men to a target firing five shots each would occupy an hour and forty minutes. If any time is given in instruction, it would be over two hours. Yet the result is only five shots a man, too little to make up for the lost time.

The plan adopted by the best company officers is to devote a few minutes during every drill to position drill and indicator practice, and to have those who can average over inners shoot occasionally in the gallery, getting up company matches for badges, etc., so as to excite an interest and stimulate individual practice.

In these armory ranges many experiments have been made in regard to targets and ammunition. The former are described in the "Manual of Rifle Practice." For the latter the favorite seems to be the service cartridge, loaded with either thirty-five grains of powder and the usual bullet, or twenty grains and a carbine bullet (the former giving slightly

the best results), the space between being filled up with soft wood sawdust.

Those States who are now introducing rifle practice as a part of the instruction of their National Guard will have a much easier task than those who first took it up. The international rifle matches, the influence of the press and the success of other States, have cleared their path of many obstacles which those first in the field had to encounter. At the same time success can only be obtained by building up an interest among both officers and men. Matches among the men, and contests between company teams of each regiment, should be encouraged in every possible way. Annual matches in the various divisions and a general State match where all the regimental teams contend for the championship, are of great value.

Undoubtedly the object of the system is to instruct the entire rank and file; and, theoretically, a team, however good, helps but little towards increasing the skill of the regiment it represents. Practically, however, it is otherwise. The competitions for places upon the team stir up an organization and bring out the shooting men. Many learn to shoot for the honor of being "on the team," and others for the honor of their company or regiment. The practice brings together those interested in shooting, and helps to create a public sentiment in the subject, which helps the shooting of the entire regiment. A victory of a regimental team frequently has the happiest effect, and even a defeat excites regimental pride to try to do better.

The prizes for the division and State matches should be given by the State. In New York they are generally bronze figures, which are displayed in the officers' room of the victorious organization. For individual matches badges seem to be the favorite prizes. As a general rule, it is found better to require a prize to be won three times before becoming the property of any competitor. This makes the competition more exciting, and adds to the value of the prize itself, besides making it last longer. The State itself should also reward its riflemen.

There is probably nothing that has been found of greater value in New York than the institution of the "marksman's badge." This is a bronze medal (gilt) suspended from a bar bearing the words "marksman, 187—." At the close of each year these are presented in front of each regiment to all its officers and members who have qualified in that class, and their names and scores are announced by the adjutant-general in a general order,—that of 1878 covering seventy-six pages. At the close of the next year all badges are turned in, and those who have again qualified receive them back with the addition of an extra bar for every year. Those who have failed are not allowed to wear them. With every year the desire to wear this badge is found to be more general, and when a man has once won and worn one, he is found to be extremely careful not to be obliged to surrender it.

In addition to this badge, the "figure of merit" and "company classification list" are found useful. The former shows the shooting of each organization in the State, and is published in the same general order with the marksmen, those regiments and companies making a high figure being specially complimented.

It is made up from the annual returns of rifle practice by allowing ten for each man remaining in the third class, thirty for each in the second, sixty for each in the first, and one hundred for each marksman. These figures aggregated and divided by the strength of the organization gives its "figure of merit." The figure of merit of the best company in New York last year was 85.08, and there were eighteen having over 50.00.

The three best regiments were the Forty-ninth (Auburn), 49.33; Twenty-third (Brooklyn), 47.07; Seventh (New York), 42.05. One of the advantages of this method is that organizations feel the necessity of bringing their men out if they would stand well, the apathy of some company officers detracting from the regimental standing. Since its adoption a strong regimental feeling against "shirking rifle practice" has been developed.

The company classification blank is designed to accomplish the same objects. It is a large card, on which the name, score, and standing of each man of a company is entered. This is conspicuously posted in the company-room, and is required to be kept there during the year. The marksmen and first-class shots like to have their names thus displayed, the third and fourth class men do not, and, as the only way to prevent it is to shoot better, they try very hard to do so.

These methods may strike some as being unnecessary on the ground that all that is necessary in military matters is to order what is required and exact obedience. But I doubt if this can be done in such a matter as rifle shooting, even with regulars. Certainly with National Guardsmen no pains should be spared to excite an interest in duties which otherwise would be apt to be onerous and distasteful. Certainly experience shows that they have worked like a charm since their introduction.

In fitting up ranges they should be regarded mainly from a military stand-point. Long-range shooting is valuable, and to a certain extent should be encouraged. But the number of those who participate in it is so small that it is only occasionally that their contributions to a range will make up for the increased expense which is required to secure the distance they need for their practice. For military practice, six hundred yards is usually all that is required. If a longer distance is needed, the right to erect firing platforms in adjoining fields can usually be hired at a comparatively slight expense. Wherever practicable, ranges should be fitted up with sunken butts and iron targets. While this is somewhat costly it is permanent and gives more satisfac-

tion than anything else. When funds are limited, targets of wood or canvas may be erected at a slight expense.

It is better to have an improvised range than to have its usefulness destroyed by debts.

States should aid in erecting ranges by issuing targets and appurtenances, and by contributing part of the cost of their construction. But little aid can be expected in the way of support outside military circles, and except on rare occasions the "gate money" does little more than pay the gatekeeper.

While the men should be instructed in their drill-room, yet while they are upon the range no pains should be spared to teach them as much as the time will allow.

The detachments should not, therefore, be larger than can be accommodated, and while waiting their turn to shoot the men should be practiced in aiming, drill, and with the indicator, care being taken not to tire their arms so as to prevent them shooting accurately when their turn comes. Their sights should be blacked and set at the correct elevation, and the proper allowance for wind told them before they go to the firing-point, and when there, a skillful shot should stand by to "coach" them and correct their errors.

The best shots of each company should be used for this purpose, under the direction of the company officers. Strict discipline should be kept; officers should remain with their companies; the men should be kept together and away from the firing-points, and, above all, kept at work. The squads should be sent from one target to another under charge of a non-commissioned officer, and no straggling, drinking, or boisterous conduct permitted.

Volley firing is an important part of rifle practice, more so than is generally appreciated. The rapidity with which modern breech-loaders can be discharged requires that great attention should be paid to "fire discipline," and the keeping of the fire of troops under rigid control.

After men have been instructed as individuals, experience shows that if the commands are properly given men will shoot as well, and sometimes better, by volley than when firing singly, and almost always better than in file firing, where they are disturbed by the movements of their comrades. In several papers read before the United Service Institution of Great Britain, upon the Turco-Russian war, it is stated that all European authorities concede that in future infantry fire will be employed by volleys, and at the extreme ranges (one thousand to fifteen hundred yards), and that for this purpose careful practice is necessary.

This, of course, is something far in advance of American troops, who practically do not know how to shoot at all. Yet it should be borne in mind in shaping our course of instruction. In addition, volley firing is important in the National Guard as teaching them steadi-

ness, to obey the voice of their officers when in their rear, and to appreciate the crushing effect of their fire if properly delivered. This fire being that which they would be required to use in case of riot, there are special reasons why they should be familiar with it.

It is not necessary that the various States should delay the instruction of their troops in rifle practice until ranges are provided for their use. To do this would be as if a colonel were to put off drilling his command in the manual and facings because they had no facilities for battalion drill.

The place to commence is in the squad drill-room, and during company drills, where no particular arrangements are required. From there it can proceed as far as circumstances will admit, but the amount of instruction that can be obtained without going further will be found surprising.

If proper facilities are provided, if the men are thoroughly instructed during these drills, and, while required to shoot through their classes, are properly stimulated and encouraged, but a short time will be required to make a large proportion of the National Guard of any State good shots, and to give them all a fair idea of how to use their rifles.

BRIGADIER-GENERAL GEORGE W. WINGATE,
Gen. Ins. of Rifle Practice, N. G. S. N. Y.

THE MILITIA OF THE UNITED STATES.

THAT "there are always two sides to a question" is particularly true of the subject of Militia Reform, recently brought up for public consideration. Many look upon the matter solely in the light of local or State interests, others regard the militia only as a possible "second line" for national defense. Both views are good as far as they go, and both must be combined and harmonized in order to produce the best results. It is this broad phase of the question which engaged the serious and careful attention of the convention of delegates from nineteen States, lately assembled in the city of New York; their conclusions were subsequently expressed in a bill "To reorganize and discipline the militia of the United States," just introduced in both houses of Congress.

Much has already been written with regard to the past and present condition of the militia, but it is rather the *future* of this important military reserve that we desire to discuss now. To this end we may profit by its history and present condition, in a technical sense, acknowledging, in a political sense, the undoubted prerogatives of a State, without, on the other hand, forgetting the claim which the federal government may have at times to the hearty physical support of every able-bodied American citizen. These are privileges which he enjoys, and debts which he owes, under the Constitution of his country, and neither the sophistry of the demagogue nor the eloquence of the political partisan can blind him to the nature and extent of this dual allegiance.

In the first place, we may consider the effect of the proposed reform upon the State. There has never been a time, since the earliest settlement of the country, when the necessity for a local military force has not existed and been recognized by the people. This force has always been a species of militia, of irregular organization and discipline, which has cost the taxpayers much more than a smaller force of superior efficiency. The time has come when the people must decide whether they will support a regular army of seventy-five thousand men on a peace footing, in the absence of an improved militia, or—in addition to the present army of twenty-five thousand men—encourage in each State the organization of a well-selected, clothed, instructed, disciplined, armed, and equipped body of volunteer militia, to perform such duties

under the direction of the Governor as may be lawfully required of it, besides being available for national purposes, as we shall hereafter show. The labor riots of 1877 brought out a great variety of opinion as to the kind of military force best adapted for the suppression of domestic turbulence. In many cases this opinion was hastily formed, under the influence of fear for the safety of homes and property, but in most instances the remedy for the disorder was made clearly apparent in the lurid light of burning warehouses, and was impressed the more deeply upon the hearts of the victims by the bitter experiences of that time. In the largest and wealthiest city of the West, great merchants went about trembling with anxiety, and the arrival of a single company of regular infantry, fresh from the plains, was hailed with delight and indescribable enthusiasm; it was the relief of Lucknow repeated, one would have thought. And once there, the besieged would fain have kept the soldiers. They appealed to Congress to increase the army to one hundred thousand men, and authorize the establishment of a permanent garrison in their city, so that never again might they be exposed to torch and bludgeon. In a great Middle State, things were even worse; the people of France were not more astounded at the grievous collapse of the leading military system of the world, than were the citizens of the United States at the helplessness found to exist in the keystone of the national arch. Again came an appeal to Washington, and later it was coupled with a petition for a military post to be planted in the very heart of the great Commonwealth. These are but two out of a dozen instances of the inability, then, of most of the States to take care of themselves. The full extent of this want of preparation was not developed, as the riots, in many sections, died out for want of funds or leaders; a little more organization doubtless would have caused a blaze which the available army and the efficient part of the militia combined might have been powerless to extinguish.

The experience of 1877 was valuable in that it demonstrated the value of discipline and started the march of improvement in several States. To-day, Pennsylvania, with ten thousand men, has a more complete system than New York with her twenty thousand. Pennsylvania was startled from her apathy into a change based upon professional experience, and in making the change scores of political soldiers have been slaughtered. Illinois has also become alive to her real interests. New York is still supporting a powerful machine of patronage, with more generals than good regiments, and, it may be, will require some costly lesson to disturb her false sense of security.

The preference of the people is shown for a militia of organization and discipline fit to cope with the most dangerous and wide-spread disorder. The suppression of a mob and street-fighting demand the highest military qualities among both officers and soldiers, more than ever now and in this country, with the number of ex-soldiers and others ac-

customed to arms, subordination, or command, floating restlessly about; besides, the possession of Yankee ingenuity and ready resource renders an American mob—especially in labor troubles—the most dangerous that can be conceived. It is an open question how far militia can be rendered effective for such a purpose. Their social or business connection, greater or less, with the very element they may be brought in their military capacity to contend with, is a point to be seriously considered, especially as it may render an otherwise competent force utterly worthless. The habit of thinking for himself which the citizen soldier possesses in a marked degree, is another obstacle in the way of forming an entirely reliable force for such an emergency. One regiment may be free from all such weakness, while another may be "honey-combed" with sympathy for the cause or persons of the mob; and generally the truth becomes manifest at a most embarrassing moment—in the face of the enemy. The bravest and best officer may well hesitate to trust his reputation in the keeping of such a capricious command, and no good commander will care to lead militia into action unless they have had at least all the instruction and discipline they are capable of receiving. The moral faults we have supposed to exist can only be neutralized by the best system of preparation for serious military duty known to the profession. Then only will it be possible for a State safely to rely upon local resources.

Let us look at the most conspicuous features of the proposed legislation. The age of citizens subject to enrollment as militia, whenever an emergency demands their service, is limited as in the existing law, —eighteen to forty-five years. Nothing is said as to the maximum age of men who wish to enter the ranks of the "active militia." This is an important omission; out of the male population of each Congressional district there should be little difficulty in selecting seven hundred vigorous men under thirty years of age; exceptions to this rule might be made in favor of those who have served one year in the field, or three years in the militia, and desire to enter the service of the State; and the individual status of efficient men already under arms should not be disturbed. As the reserve militia comprises the remaining physical power liable for war duty only, its enrollment should not be made under a variety of methods (as proposed), but should be under the direction of the War Department. It is a noticeable fact that the tendency of the pending bill is to increase the independence of the States and to grant them new privileges. Congress is empowered by the Constitution "to provide for organizing, arming, and disciplining the militia." Under the new bill the organization of the National or State Guard of the several States or Territories *shall be prescribed by the Legislatures thereof.* Such organization shall conform as closely to the method prescribed for the "regular army as the circumstances of the various States and Territories will permit." The existing law, in con-

formity with the letter of the Constitution, prescribes the details of organization, and is in this respect more arbitrary than the proposed substitute. The idea of a service dress is generally looked upon with favor by a majority of the State authorities, and the method of selecting a uniform pattern is undoubtedly the most practical that could be suggested; the army members of the board would contribute the experience of the field and of foreign observation; the militia officers would have an eye for appearance, and each member representing a different geographical section of the country would be competent to consider questions of comfort and climate. The importance of dress and equipment, as factors in making efficient soldiers, cannot well be exaggerated; it would be as reasonable to require a man in a straitjacket to win a foot-race as to expect activity and celerity of movement from a soldier laced and padded in the average militia uniform of the present day.

It has been suggested that the completeness of any design, recommended by the board, would be enhanced by some distinctive mark or facing indicating the State to which the troops belong. Even more important than the above, perhaps, is a manual of regulations; the provision for this purpose would put into the hands of every State soldier a military *vade-mecum;* it would encourage self-instruction and give a significance to orders, which otherwise, the private soldier could only appreciate after long service and much groping in the dark; to officers—especially of the lower grades—the possession of such printed authority on matters of detail would impart confidence and firmness. The purposes for which the appropriation of one million dollars is to be expended are clearly set forth, and in giving a State the privilege of selecting the pattern of arms required, precautions are taken to protect both the general government and the State from imposition or extortion on the part of contractors. Of the instances in which the services of officers of the army are utilized under the pending law, we shall only say that prominent officers of the militia express themselves warmly in favor of both. There can be no doubt that the United States—under its constitutional prerogative—has a right to inform itself, by close and direct observation, of the strength and condition of the force it is authorized to organize, arm, and discipline. In the desired law this right is made a matter of privilege, dependent upon the consent of Governors: another concession on the part of Congress in favor of a State. The clause referred to, reads, "The President shall detail an officer from the active or retired list of the army to accompany the State inspector during his inspection, and observe the general condition of the troops and public property, with the consent and under the general direction of the Governor." Besides the military information thus annually obtained by the War Department, a uniform compliance with the law would be secured, and a just and equitable distri-

bution of the appropriation among the States rendered certain, by this paternal supervision of the federal power. As to the detail of regular officers as adjutants or adjutants-general of militia, the matter is left optional with the commanders of regiments, brigades, or divisions, the Governor, the War Department, and the officer nominated: a board not likely to agree upon anything detrimental to public interests. The encouragement to rifle-practice, specified, is only a continuation of the good work done in some of the Middle States and in the army by the movement at Creedmoor. The encampments provided for are of the first importance, if the necessary details are observed in the execution of the law. In a five days' camp, with competent instructors, militia would learn more of practical soldiering than in ninety days of armory duty. The manner of selecting a camp-ground, of pitching tents, of outpost duty, of movements over rough country; how to surmount natural obstacles, the providing of makeshifts, sanitary precautions, the treatment of the sick, military cooking, breaches of camp discipline and their treatment; and the thousand details of service only developed in the field,—a knowledge of which is only possessed by the thorough soldier,—make encampments especially necessary for the class of which I am writing. The presence of some skilled officers on the staff of the commander of the troops is essential to the success of this plan. Such an occasion would be suitable for the annual inspection already referred to. All the paragraphs of the present law which relate to the use of the militia in time of war are retained.

Turning from the contemplation of the proposed reform, as it affects State organizations, under the conditions of peace, it may be interesting to note how far it would make the militia effective for national service. Under the present as well as under the pending law, every able-bodied man between the ages of eighteen and forty-five, not already in military service, or otherwise especially exempted, belongs to the militia. In this class are to be found veterans—formerly of the regular or volunteer service—who disdain the term "militia," but are nevertheless not so ready for an emergency as an organized force of less experienced men. It is a very common thing to hear people say that in case of great public necessity, "a vast army of veterans would rally round the flag," and that an invincible army would spring up in a night, as it were. Steuben, anticipating similar misapprehension, warned the people against such mistaken dependence. Within a few years after a war many of the survivors become too old or feeble to be available. Another class, still able to bear arms, have forgotten all of their military experience save its trials and hardships, have become wedded to habits of ease or the pursuit of wealth; but a small percentage of those left would care to serve their country excepting with a commission and a sword, instead of a musket and an enlistment paper. So that, in 1879, the United States must depend almost as much on raw levies for future food for powder as

in 1861. Some eloquent harangues were heard in Congress but a few days since, from learned lawyers bent on sweeping away the handful of soldiers called an army. They said, "We want no organized military force, but should depend upon the love and patriotism of the people in case of trouble." Love and War have been combined in one sentence before, but hardly in the same sense. Unless the affection of the people is ironclad, disciplined, and organized, but few battles can be won by its aid. Playing with an army bill in Washington, or carrying an occasional "espontoon" in Massachusetts, will hardly make able statesmen or efficient soldiers.

The pending law would give us within two years after its passage an excellent active militia force of one hundred and fifty thousand men, susceptible of expansion in case of war to two hundred and twenty-five thousand without additional organizations or officers; this by increasing the number of men to a company, the minimum war strength of which in the infantry might be one hundred and fifty men, without detriment to the efficiency of the corps. In case of necessity, upon the call of the President from the "second line" there would doubtless be available seventy-five per centum of this body; the remainder would of course remain at home for local purposes. The process of organizing the volunteers from the reserve militia would require as much of six months' time as the ability of two hundred thousand men of the army and active militia to meet the emergency would permit. The value of this time in preparing a force enlisted "for the war" can hardly be exaggerated. In none of our wars have we seized a moment at the start to take breath or to gird up our loins for a severe struggle, but have invariably plunged—ignorantly, impetuously, extravagantly—into the fight with raw, undisciplined, hastily-organized masses of men. Of course under such conditions the campaign has been protracted, or there has resulted a series of campaigns, none the less bloody nor indecisive that the troops were inexperienced; and it seems almost superfluous to add, in view of the fact that the United States has not recovered from the results of a conflict which ended fourteen years since, that for every year of war there ensues a period of financial depression varying from two to five years. One year of that conflict was wasted in experiments and speculations. Seasoned or well-instructed troops might have tested each other's strength in that time, and almost have reached the conclusion which it actually took so much longer to arrive at.

Although nearly all professional soldiers, who are familiar with the present militia systems and with the *personnel* of the better regiments, approve of the plan before Congress, yet there are some officers not so well informed on this subject who do not favor the proposition. These hold that merchants, clerks, mechanics, and laborers cannot work for their daily bread, or prosper in their pursuits, and at the same time be made good soldiers. But we ask, "Is this a good reason why these

citizens should not be encouraged to go as far on the road towards the condition of a good soldier as his opportunities will allow?" "Is not this promoting the military interests of the country by instructing its reserves?" The largest number of good officers appointed in the regular and volunteer forces during our late war received their earliest military instruction in the militia. A single regiment in Rhode Island contributed two hundred commissioned officers to the Union army, five of whom were generals. And if that came of a weak imitation of a military system, what may we not expect from a reformed and modern plan?

By neglecting the improvement of the "active militia," and depending upon prospective "volunteers," who are really "reserve militia" unenrolled and unorganized, we are "fostering a deception" indeed; as well prefer the crude mineral to the coinage of the mint as a circulating medium. It is not a good argument against militia reform to dwell too much on its past imperfections and the well-merited contempt into which the term "militia" has fallen in many parts of the country. It is within the memory of most American soldiers that it was once said of that corps whose brilliant war record is emblazoned with the names of Buford, Sheridan, Merritt, Stoneman, Wilson, Custer, and Mackenzie,—"Who ever saw a dead cavalryman?" And a cloud of witnesses from Beverly Ford to Five Forks rise up to testify to the value of instruction and discipline.

That the militia when uniformly instructed, clothed, equipped, and more closely modeled after the pattern of the regular force would be vastly more available and efficient for national purposes there can surely be no doubt. And it is therefore to be hoped that the members of the National Executive Committee, formed at the close of the late Convention, will not relax their efforts until a new law, similar to the bill we have been discussing, has been substituted for much on the subject of militia which now encumbers the statute-books and paralyzes that arm of the nation.

THEO. F. RODENBOUGH,
Bvt. Brig.-Gen. U. S. Army.

THE UNITED STATES NAVAL INSTITUTE.

In order to meet a want long felt in the navy, a number of officers, then serving at Annapolis and Washington, determined, in the fall of 1873, to start a society with the general object of mutual improvement in professional matters.

The society selected for its title that of The United States Naval Institute. It was to be modeled, to a certain extent, after the Royal United Service Institution of Great Britain.

Rear-Admiral John L. Worden was the first inscribed member. The first regular meeting was held in the lecture-room of the Department of Physics and Chemistry, at the Naval Academy, October 9, 1873. The first paper read, but not published in the Journal, as it was to appear in another form, was that of Commodore Foxhall A. Parker, entitled "On the Battle of Lepanto"; Rear-Admiral Worden being in the chair. The first paper published was "The Manning of our Navy and Mercantile Marine," by Captain S. B. Luce, November 13, 1873. Since then papers have been read at nearly every one of the monthly meetings, which take place at eight o'clock in the evening of every second Thursday in each month between October and June.

The necessity was, and is, so great for such a society, that its founders expected that all those who were available for membership would be glad to join. They therefore modeled their official organization on a grand scale, with permanent officers, etc., similar to that of other great societies in our own and foreign countries.

In 1876 the constitution was amended in many particulars, especially in regard to its officers, it being decided that all officers should be elected annually from among the members. That the officers should be: a President—1877, Rear-Admiral C. R. P. Rodgers, U.S.N.; 1878, Commodore F. A. Parker, U.S.N.; 1879, Rear-Admiral John Rodgers, U.S.N. Vice-Presidents,—one to be elected by the officers of each station. Annapolis, up to 1879, was the only one that could be heard from. Its incumbents were: 1877, Medical Inspector A. C. Gorgas; 1878, Commander A. T. Mahan; 1879, Commodore F. A. Parker. Washington, in 1879, elected for its Vice-President Rear-Admiral John Rodgers, but as he was at the same time elected President of the Institute, he was immediately replaced by Rear-Admiral Thornton A.

Jenkins. A Secretary of the Institute—1877, Lieutenant Theo. B. M. Mason, U.S.N.; 1878, Lieutenant Theo. B. M. Mason, U.S.N.; 1879, Lieutenant John C. Soley, U.S.N. A Corresponding Secretary of the Institute—1877, Passed Assistant Engineer W. L. Nicoll, U.S.N; 1878, Passed Assistant Engineer W. L. Nicoll, U.S.N.; 1879, Professor Charles E. Munroe, U.S.N.A. A Treasurer of the Institute—1877, Commander W. T. Sampson, U.S.N.; 1878, Commander W. T. Sampson, U.S.N.; 1879, Chief Engineer James P. Sprague, U.S.N. Corresponding Secretaries for each of the stations. At Annapolis the Corresponding Secretary of the Institute also holds this office. Washington, in 1879, elected Lieutenant J. H. Moore, U.S.N.

It will be seen by this arrangement that for the society at large there is a head,—the President, a Secretary, Corresponding Secretary, and Treasurer, who are *ex officio* the Executive Committee, and therefore should always be elected from the members serving at the station which is chosen as the centre. Annapolis is at present this centre, and should remain so, as the birthplace of the Institute and the residence of one of its parents, the Naval Academy, on account of the large number of officers permanently stationed there, whose every-day duties lead them to study and take interest in just such subjects as it would be most interesting to have discussed. It also affords the facilities of a good theatre, professional library, and many valuable collections of models and instruments.

Each of the other stations, whether sea or shore, is provided with a Vice-President and Corresponding Secretary, who also by the constitution performs the duties of Secretary and Treasurer for the station. In this way a complete organization is at hand for the transaction of business and the holding of meetings.

It is the intention of the constitution that independent meetings should be held at each of the stations, papers being read and discussed thereat. These papers would then be forwarded to the Secretary of the Institute, and printed in the Proceedings with the discussions, if recorded, for general circulation. In this way every member would have the benefit of every paper that was read throughout the organization. So far Annapolis and Washington are the only places at which meetings actually take place. It is hoped, however, that ere long there may be more. It takes very few men to form a meeting; the whole society is really listening to the lecture.

Article IV. of the constitution provides:

1. That the Institute shall consist of members, honorary members, and associates.

2. All officers of the navy, marine corps, and of the academic staff at Annapolis and civil staff at Newport shall be entitled without ballot to become members on payment of the initiation-fee and dues to the Treasurer at Annapolis or Corresponding Secretaries on the stations.

3. Honorary members shall be chosen from distinguished naval and military officers, and from eminent men of learning in civil life; provided that the number of such members shall in no case exceed thirty.

4. Associates shall be chosen from persons connected with the military and naval professions, and from persons in civil life who may be interested in the objects that it is the design of the Institute to advance.

5. Honorary members and associates shall be elected as follows: nominations shall be made in writing to the Executive Committee, and such nominations, with the name of the member making them, shall be entered in the minutes of the committee. At the succeeding meeting of the Institute the committee shall report. If the report be favorable a majority of the members present shall decide the election; but if unfavorable, a two-thirds vote shall be required to elect the candidate. Two members of the Executive Committee shall constitute a quorum for carrying out the requirements of this section.

6. The annual assessment for a member shall be five dollars (reduced to three, 1879), and for an associate three dollars (reduced to one, 1879), payable on joining the Institute, and on the first day of each succeeding January.

It will be seen by the foregoing rules that all who desire to become members or associate members can readily do so. An amendment is now in consideration permitting ex-naval officers, who left the navy in good standing, to be elected full members. It will also be seen by Section 6 that the expense is very small, as small as it is possible to make it, only three dollars a year, *twenty-five* cents a month.

In order to keep the expenses down it will be necessary to have a large membership, so that it is to the pecuniary interest of all members to induce others to join.

The first published lists of members included, in 1874, 74 names. 1877, original members, 74; resigned, dropped, etc., 8; remaining, 66; joined, 63; total, 129. 1879, old members, 129; resigned, dropped, etc., since 1877, 21; remaining, 108; joined, 116; total, 224. It will be seen that the membership is steadily increasing. That the increase is not as rapid as it should be is, however, a sad commentary on the desire of our officers to lift a hand to assist in their own improvement.

Chief-Justice Charles P. Daly, of New York, President of the American Geographical Society, was elected the first honorary member. John Ericsson, Esq., was the second. This gentleman has donated to the Institute a splendidly-bound volume, containing descriptions and drawings of all his valuable inventions. It was originally prepared for the Centennial Exhibition, and is the first donation to the society's collection.

Colonel T. Bailey Myers, of New York, was the first associate member, and N. P. Bailey, Esq., of the same city, the second.

Article VII., Section 4, of the constitution provides that annually,

or as much oftener as the Executive Committee may decide, a record of the papers read before the society, and the discussions growing out of them, shall be published in pamphlet form. Papers on intricate technical subjects may be published as a part of the Proceedings of the society without being publicly read, if in the opinion of the Executive Committee the subject to which they relate be not of a character to be appreciated on merely casual investigation.

This article has been amended so as to include in the publications descriptions of new inventions, new theories and methods, either foreign or home, which may be of interest to a professional student. The published Proceedings already fill three volumes. They are now issued in numbers, consisting of one or more papers each, in order to put the matter in circulation more quickly, and it is hoped that there soon will be, with the aid of the branches, sufficient material to publish a number monthly.

There are few officers in the service who do not or have not read these Proceedings. Many borrow the copies from members, read them, and liberally criticise them. If what they read pleases them, they should certainly be willing to subscribe twenty-five cents, little more than the price of a good cigar, a month for an increase of this pleasure. If what they read displeases them, for a like small sum they can enter into the discussion, which is perfectly free, and have their own ideas published. Every officer should be a member, and after becoming a member, his next duty is to subscribe a little brain-work, or in other words write an article, make a translation, or send descriptions of anything novel and useful in a professional way that he may come across, even if he has to copy or clip them out of a foreign or domestic work or newspaper. He can certainly do one of these things, and by so doing help on those who may not have the same opportunities. It is impossible for one man to study up all the different branches of our profession, but a careful *résumé* of an expert's researches will do much to make others practically proficient. Many of us say that we cannot write, because we cannot imitate the great authors. Fine writing is not what is wanted. A clear, concise statement of well-assured facts is what makes up an interesting article or lecture. The writer of this article was first given confidence by getting up an article to read before the Institute, when he was its Secretary, because he had been unable to get any one to do so for him, and because he was afraid that it was the intention of the members to adjourn indefinitely, no paper having been forthcoming for months. Fortunately, the subject announced was a novel one, and brought together, more from curiosity than otherwise, a goodly number. The next day twenty new members joined the Institute, and the supply of papers has been continuous ever since.

Some officers are so lukewarm in their feelings towards the Institute that they may almost be called its enemies.

The man who says, when asked to join, "Well, what is it? what has it done?" should remember that had the first member asked this the Institute would never have been formed.

He who says, "I will not join because there is no free discussion," has never attended a meeting of the society, which he is perfectly free to do, all officers whether members or not being invited, and has never studied its constitution; a request to abstain from the discussion of a *certain subject* not germane to the objects of the society, and holding the same position in reference to the members that that of politics does in a social club, from which it is generally excluded, has been magnified by some into a suppression of general discussion. Nothing can be more free than the discussions which are actually held, all taking part, from admirals to ensigns. If there is any lack of it, it is due to the good sense of the elder members, which prevents their taking part in arguments that sometimes wander far from the point, or to the natural diffidence of the younger ones to express an opinion. This discussion should and would always be published with the Proceedings, but the lack of a short-hand writer or the funds to procure one (twenty dollars a meeting at Annapolis, besides expenses from Baltimore, etc.) has prevented their being reduced to writing. The best part of a paper is generally the discussion, in which the ideas of all present are brought out, inaccuracies corrected, and obscure points and remarks enlarged upon.

The fact has been thoroughly proved that a few or even one energetic man at a station can set others in motion. Let such persons, then, take the matter in hand at the stations not yet heard from.

It is rumored that New York is soon to have its branch,—the sooner the better.

An attempt was made two years ago to start some people by appointing them Acting Corresponding Secretaries, and asking them to organize the branches; but evidently the wrong ones were selected, as nothing was ever done by them.

Members are heard to complain at times that they do not receive their Proceedings regularly. If they will only consider a moment they will perhaps find that they are thousands of miles from the place that they had given, years before, to the Secretary as their address. For instance, officers sometimes leave the Naval Academy, where they have been receiving their Proceedings, and go to China, without notifying the Secretary of the change. He certainly cannot be expected to know intuitively where every member is; nor does that valuable publication, the *Naval Register*, appear often enough lately to render him much assistance. Letters addressed to the care of the Navy Department sometimes reach their destination; but it would hardly be expected that a whole edition of the Proceedings should be forwarded in this way,—at least in the present unrecognized official status of the society.

So thoroughly is the French naval ministry convinced of the efficacy of essay-writing, that they have made it a regulation that every officer on shore duty for six months is forced to send one in on some professional subject. These essays are subjected to a board, and, if considered of sufficient worth, are published in an official journal for general information. They are also counted for or against the writer in his next examination. Officers showing great proficiency are detailed as a sort of intelligence bureau, furnishing material for general improvement.

The English Admiralty offers every inducement and facility to the Royal United Service Institution, which is really semi-official in its nature; the facilities are sometimes substantial in their form, consisting of models, descriptions, official publications and data, etc.

The French, Italian, Russian, and German Navy Departments all have official publications for the use of officers, which contain all the information necessary for them to keep thoroughly posted.

In our country, where we boast so much of our general information and the means put within every one's reach for improvement, we have not a single official nautical publication. There is no possible way for an officer to keep himself informed as to what improvements are going on, what appliances he may be expected to manipulate, what new methods of navigation have been invented, what are the peculiarities of the ships he may have, at a moment's notice, to handle and command; in fact, a thousand and one points of useful information which can only come, to be of any value, from official sources. It is true that the Bureau of Ordnance and Navigation tried to some extent to fill the void, but even their efforts have ceased for want of funds.

It is to meet this want that the Naval Institute is striving. Our members must be kept posted, if only to fit them for their examinations. We must constitute ourselves a sort of mutual learning company; all must help; the Admiral giving the valuable information which comes to his office, the bureau chiefs and chiefs of stations, Hydrographic Office, Naval Observatory, Experimental Battery, Torpedo School, Naval Academy, all furnishing their quota; officers on foreign stations, where they have, or might have if they chose, such excellent opportunities to study out foreign inventions and novelties; officers doing scientific duty, the results of their researches; persons with hobbies ventilating them; inventors furnishing descriptions of their inventions; in fact, make the Naval Institute the bureau of information of the navy. That this object was not attained at first is self-evident; that we are gradually coming to it may, however, be seen by the increase in the quantity and quality of the papers. It is true that the papers still treat a little too much of historical research, but this comes from the diffidence of officers to launch out and express their opinions on the questions of the day.

The intelligence department has been hampered by the fact that no one has the time or opportunity to take charge of it, and the bureaux and other officers do not furnish their information. It is hoped that soon the thing may be presented to our honorable Secretary by our President in such a light that he may authorize or even direct the bureaux to furnish the necessary information. An officer might be detailed to direct this department, so necessary for the education of the officers of the service, or, at any rate, the society might make it an object to some retired officer to become its permanent Secretary, as is the case with the Royal United Service Institute.

At a meeting of the Institute, held at the Naval Academy, June 13, 1878, it was resolved, that—

A prize, to consist of one hundred dollars in money and a gold medal of the value of fifty dollars, be offered annually for an essay on a given subject, under the rules herein stated. The money value of the medal may be given to the successful competitor if he so elect.

Competition for the annual prize is to be open to all persons who are eligible to membership, each competitor to send his essay in a sealed envelope to the Secretary on or before the 1st of January in each year. The name of the writer shall not be given in this envelope, but instead thereof a motto; this motto, with the writer's name, to be sent to the Secretary in a separate sealed envelope, which is not to be opened until after the decision of the judges.

The judges to be three gentlemen of eminent professional attainments, to be selected by the Executive Committee.

The successful essay to be published in the Proceedings of the Institute, and the essays of other competitors to be published also, at the discretion of the Executive Committee, with the consent of the writers.

The successful competitor shall be made a life-member of the Institute.

The subject of the essay for January 1, 1879, was "Naval Education," divided under two heads: 1st. Officers. 2d. Men. There were eleven competitors, the same number exactly that competed for the last naval prize offered by the Royal United Service Institution. This at least is encouraging, and shows that there are those in the service who can write, if only urged.

The committee of judges selected were Charles W. Elliot, LL.D., President of Harvard University, Rear-Admiral Daniel Ammen, U.S.N., Engineer-in-Chief William H. Shock, U.S.N. Up to the date of the writing of this article the decision had not been rendered, nor had the subject for next year been selected.

T. B. M. Mason,
Lieutenant U.S.N.

THE ZULU WAR.

It is scarcely necessary to repeat here the details of the sanguinary disaster which recently befell a column of British troops in South Africa, the accounts of the affair as published in the newspapers being still fresh in the mind of every reader. It will be sufficient for the present purpose to state the principal facts in a single paragraph.

On the 22d of last January the Zulus enticed the British detachment which had been left to guard the supply camp near the Tugela River from their intrenched position, and then gave battle, speedily overwhelming them, and capturing all the ordnance, commissary, and quartermaster's stores in the camp. The number of the Zulus is estimated at from fifteen thousand to twenty thousand. By a strange omission the number of the British engaged is not given, though it was probably about seven hundred men, with eight hundred native auxiliaries. The loss was about two thousand Zulus and six hundred British. Loss of the auxiliaries not stated.

Such is the substance of the melancholy story,—simple as it is shocking. In order to explain the causes which led to such a dread culmination, and to clearly show the condition of affairs in South Africa to-day, it will be necessary to look back over the history of those distant colonies for the last seventy-five years.

The Orange River Free State was settled about the beginning of the present century by Dutch Boers, subjects of Holland. As a matter of political "expediency" the State was annexed to the British colonies in 1848. Not appreciating this summary change of sovereignty, many of the Boers crossed the river Vaal, which was the boundary-line, and established the new government of the Transvaal Republic, the independence of which was declared in 1852. The weak settlements were continually harassed by the surrounding tribes of natives, who made regular plundering incursions over the border. Foremost among the depredators was Secocoeni, the principal chief, though a rather insubordinate one, of Cetewayo, the Zulu king.

In 1876 the Boers began a war with Secocoeni, who, assisted by Cetewayo, who claimed a large district included within the Transvaal, inflicted several serious defeats upon the little bands of Dutchmen who had the sublime courage to face overwhelming odds. The situation be-

coming every day more serious, and it being evident that the miniature republic was unable to defend itself against the horde of Zulus that came pouring in upon it, the Transvaal was formally annexed to the British colonies in April, 1877, against the protest and very much to the disgust of the sturdy Boers, who again found themselves under the disagreeable domination of British rule, from which they once before had fled. The old bone of contention—the question of the boundary-line between the Transvaal and Zululand—was now referred to the colonial government, which appointed a commission, headed by Sir Bartle Frere, the lieutenant-governor of Natal, to decide it. This decision, although favorable to the Zulus, by giving them their old boundary-line, was not altogether satisfactory to them, for some unexplained reason. They continued raiding over the border into the Transvaal, killing, pillaging, and committing outrages of every kind, gradually becoming so bold that even the larger settlements began to suffer from their visitations. Affairs reached such a crisis at last that Sir Henry Ernest Bulwer, the governor of Natal, was compelled to take decisive measures in the premises. Last December he dispatched a messenger to Cetewayo with an official letter, of which the following is a summary.

Upon the death, about seven years ago, of Panda, the late king, and the father of Cetewayo, the head-men of the Zulu nation sent a messenger to Natal to request that a British representative be present at the installation of Cetewayo, and to assist the new king in establishing a good government, with proper laws for the administration of justice. Sir Theophilus Shepstone was appointed such representative, and he framed a code of general laws for the Zulu people, by which the barbarous and indiscriminate shedding of blood was to be stopped, and no one was to be put to death without serious cause, and without first being granted a fair trial. The letter then stated several causes of British complaint. The Zulu king failed to observe these laws or to keep various promises given at his installation; all the young and able-bodied men in the kingdom are compelled to serve in the army, and are not allowed to marry without the king's permission, which is not generally granted till the men are over forty years of age; they are not allowed to labor for themselves or to live in peace with their families; the missionaries have been expelled; two Zulu women, fleeing for refuge across the border, were retaken on British soil and stoned to death; and, finally, many outrages had been committed by the Zulus upon British ground. The ultimatum of the governor was as follows: the Zulu king to disband his present army, and adopt such a military system as may be decided upon by the Zulu Council and the British representatives; the men to be allowed to marry without the king's permission; the laws formerly adopted to be enforced; the missionaries to be allowed to return; and a British resident to be allowed in the Zulu capital to see that all these conditions are fulfilled.

To this ultimatum an answer was demanded by the 11th of January last. No answer arriving up to the date named, the British troops, being prepared for the emergency, crossed the frontier the next day, and began the invasion of Zululand. The invading force, under command of Lord Chelmsford, commanding the imperial troops in South Africa, was in four columns, of about three thousand men each, including imperial and colonial troops and native auxiliaries, starting from different stations, and having for their objective-point Cetewayo's *kraal*, or chief city. On the 22d, while Lord Chelmsford, who accompanied the third column, was away reconnoitering with the main portion of the command, the Zulus fell upon the detachment left to guard the supply camp, with the awful result already stated.

The Zulus, or Kaffirs, are the finest, the bravest, and the most intelligent of all the South African races, and they have a long-established military system, which is the severest one in the world. By that system all the boys, as soon as they attain the age of fourteen or fifteen, are sent to a military kraal, and incorporated into an existing corps or regiment. The Zulu army consists of thirty-three regiments, every regiment being divided into two wings, which are subdivided into companies of from fifty to two hundred men, with appropriate wing and company officers. The total effective force, under sixty years of age, is forty thousand four hundred men. European arms are used, but they have no tactics worthy the name, the movements being of the simplest nature. The men are not allowed to marry without the consent of the king, who does not generally grant his consent till he grants it to a whole regiment, when the men average forty years of age. As this leave is occasionally given before the usual age to regiments which have distinguished themselves in battle, the incentive naturally makes the men eager for war, and consequently adds to the danger to be feared by their neighbors. The whole system, as explained, so oppressive in its exactions, tends to make the Zulus essentially a warlike and troublesome people, and the reader can therefore readily understand why Sir Henry Bulwer so strongly insists upon the disbanding of the army and the removal of the unnatural restriction to marriage. Like all barbarous and warlike people, however, force is the only argument that they will heed, and in this instance force must be used to obtain the conditions which will insure the future welfare of the South African colonists. In this, as in all similar cases, the inevitable struggle must take place sooner or later, and no thoughtful person will deny that the sooner it takes place the better. A few hundred lives lost, and a few thousand pounds spent now, will save ceaseless anxiety, constant trouble, thousands of lives, and millions of pounds hereafter. Which is the lesser evil?

The means have been indicated, and in the case of Cetewayo, the British government, awake to the necessities of the occasion, has sent

ample reinforcements to the seat of war, doubling the force already there. A short and decisive campaign, which will break the power of the Zulus, compel their submission, and bring about the desired reforms in their own midst, would in every respect be better, even for the Zulus themselves, than an armed peace with ever-threatening danger. What the British have done in Zululand we should do in our Indian country. It is criminal folly to send a few hundred soldiers against a few thousand savages, to be slaughtered by them in cold blood, as has been too frequently the case. Let Congress authorize the enlistment of even ten thousand additional troops for a year or two, so that several strong columns can be sent through the troubled districts to overawe the Indians by a display of force, which would show them the power of the whites and the hopelessness of contending against such overwhelming odds. Such a manifestation of power would be an argument that they would understand and fear; and fear, the most potent of masters, would ever after make them the most obedient of subjects. The cost of this measure to the government would be trifling compared to the subsequent saving in life, money, and property on the plains and frontier, without considering the great advantages which the Indians themselves would derive from peace.

THE CHINESE IN AMERICA—PRESENT AND FUTURE, ETC.

WHO of us who was then in existence has forgotten the excitement produced in the year 1849 by the announcement of the discovery of gold in California?

The whole country was ablaze from one end to the other, and the "gold fever" spread to the farthest extremities of the earth. Madness seemed to have taken possession of everybody; farmers sold their homesteads to raise the necessary funds to transport them to the new El Dorado, mechanics and tradesmen abandoned their legitimate callings, and even army and navy officers threw up their commissions and, equipped with pick and shovel, started for the mines in pursuit of wealth. Companies were formed in the Eastern States to go to California, some of them proceeding in crowded and frequently unseaworthy vessels by way of Cape Horn, and others making the long and toilsome march across the plains. Meanwhile, the news kept coming of larger "nuggets" and richer placers, and thousands of men hurried away from their families, not to see them again for years, if ever.

All these adventurers seemed to have an idea that if they could only reach California they would find "nuggets" scattered over the surface of the country, possessed of which they could return to the bosom of their families to pass the remainder of their lives in comfort. Very few anticipated the toil they must undergo to attain a tithe of their wishes; but the word "failure" was not in their vocabulary, and lawyers, clergymen, artists, and tradesmen of every class ventured all they were worth in the wild scramble for gold.

The route across the continent, explored by Fremont, was crowded with pilgrims to the shrine of Mammon, many of them footsore wanderers, who were compelled to throw away even their pickaxes, and were slowly dragging their emaciated frames towards the goal of all their hopes. Many died on the road, breathing their last without a friend to close their eyes. Wagons and carts were everywhere broken down and abandoned, and the bones of horses and oxen which had perished in the transit whitened the plains. But these grim portents seemed to dishearten no one; the vast procession still moved onward, its numbers

constantly increasing, urged on by the fabulous reports of new gold discoveries. Sometimes whole caravans would disappear, victims of the roving bands of Indians or of the emissaries of Brigham Young, who threw every obstacle in the way of his chosen retreat in the wilderness being invaded by the "Gentiles." But the swarms of travelers were as indifferent to fear as pious Mohammedans making the pilgrimage to Mecca. California was the Mecca of our modern enthusiasts, and gold was their Prophet.

Next the great merchants got the fever, and huge steamships were built, and routes opened by way of the Isthmus of Panama and Nicaragua. As fast as the steamships were built they were hurried off half equipped, some of them going around Cape Horn to meet the passengers coming from the east side.

The writer commanded the "Panama," one of the first of these steamers, which had started on her voyage under the command of another captain, had broken down, and had returned to New York.

Mr. William Aspinwall offered me what I then considered a large sum to refit the ship and take her out to Panama through the Straits of Magellan, and I accepted the offer.

I had rather a select set of passengers,—only fifty in the cabin and one hundred in the steerage,—because carrying passengers on the voyage out was not so much of an object with the steamship company as was quick arrival in Panama and the connection with the steamers on the Atlantic side, where river boats, turned into ocean steamers, were waiting to be crammed with live-stock on its way to California.

My cabin passengers were not intending to dig for gold exactly. They were educated gentlemen, many of whom have made their mark in California and occupy prominent positions in the State of their adoption.

My old friend, Samuel Ward, Esq., was one of this band of pilgrims, and the instant he came on board he took charge of the ship and her captain. He regulated all the passengers and gave them their seats at the table; he superintended the *menu*, the cook succumbing to him at once; he posted the distance run each day, and I strongly suspect that he worked out my observations, although, having weak eyes, he could not himself take an altitude.

When we crossed the line Mr. Ward received Neptune on board, and plied that worthy with whisky to such an extent that he escaped the ordeal of *shaving* to which his fellow-passengers were subjected,—the *first time in his life that he was thus successful.* He piloted the ship into Rio in a thick fog; that is, he stood by my side, and whenever a fishing-boat loomed up he would assert it to be a rock, which made me more than ordinarily careful; and when at last we let go our anchor in the same thick fog, Ward cried out, "By jingo, captain, we did that well!" Mr. Ward, though he has since become famous, never rendered himself

more useful and agreeable than during that voyage. He was the life and soul of the ship and shortened the passage at least one-half, to say nothing of his carrying the vessel so safely into port.

Another of our passengers was Lieutenant G. H. Derby, U.S.A. (John Phœnix), who conducted a newspaper during the voyage, which for its cleverness deserved to have been printed in letters of gold. If ever the spirits of his fellow-passengers flagged, Derby set them to laughing. When I said to him one day, with rather too much naval sternness, "No smoking allowed on the quarter-deck, sir!" he innocently replied, "Why, Cap, I'm not smoking aloud on the quarter-deck." I smiled, for I couldn't help it.

When we anchored in Rio we found the harbor crowded with American ships, and the gold-hunters who had taken passage in them swarmed on board, endeavoring to get a passage in the "Panama," cost what it might; but all the state-rooms were taken, and although I was offered four times the regular price of passage, I declined all overtures.

Most of the ships bound to California were in need of repairs, captains had violated their contracts, crews and passengers were in a state of mutiny, and the gold-seekers in desperation were making so much trouble in Rio that the American consul absconded, and the Emperor Dom Pedro began to fear that his dominions would be overrun by a set of Vandals, as the ships were constantly arriving with thousands of disappointed passengers, who saw little prospect of ever reaching their destination.

Every imaginable device was resorted to by people to stow themselves away on board the "Panama," all of which were frustrated by the vigilance of the officers; and after Mr. Ward was fully satisfied that the steamer had laid in a sufficient quantity of truffles and *patés de fois gras* to supply three times the number of people we had in the cabin, we steamed out of the harbor amid the cheers and groans of over five thousand people of different nationalities, who would have given half their lives to have accompanied us. Mr. Ward piloted us safely through the Straits of Magellan; that is, he furnished me, while on deck night and day, with pea-jackets to keep off the "pelting of the pitiless storm," for the rain and hail came down without cessation during the greater part of the passage. Mr. Ward also kept me supplied with hot coffee whenever the *Willahwahs*, which prevail in that delightful region, would allow me to take it.

We made the passage of the straits in thirty-six hours, and in spite of a heavy gale of wind we soon reached Valparaiso and Callao, and made the quickest trip on record to Panama. At this place I found about seven hundred persons waiting to proceed to San Francisco in the ship, which had accommodations for three hundred, while I don't know how many thousands were waiting on the Isthmus to get to California the best way they could. The most enthusiastic of these gold-

seekers were somewhat sobered down by their trip on the Chagres River, the discomforts of which no pen can portray.

Fortunately for me, another captain had come out to Panama to take my place and carry the steamer to San Francisco, and the last I saw of the unfortunate man he was sitting, the picture of despair, on the top of the paddle-box, his decks crowded with passengers, boxes, trunks, pickaxes, "cradles," and dogs.

I shall never forget my trip down the Chagres River on my way home, and the disenchanted people I met hurrying to Panama in expectation of getting immediate transportation to California. Hundreds of forlorn-looking individuals were to be seen trudging along with their packs; delicate women, with the most woe-begone, washed-out appearance, jogged along on sorry-looking mules; trunks and boxes were strewn along the roadside, broken open, and the contents scattered. Sick men and women lay under the thick shade of romantic-looking trees, the beauty of which was all lost on the multitude. All talked of gold. All one heard were the wonderful stories imported from California, and the riches in store for whoever was so fortunate as to reach El Dorado. This vanguard of the myriads who were to found a new empire in California were certainly a hard-looking set to depend upon for the advancement of civilization in a new country. Men of the lowest and most debased character were associated with persons of the greatest refinement; gamblers, thieves, and murderers were on an equality with the best, and I rejoiced that I had not the gold fever, but was satisfied with my condition.

I bade adieu to the motley throng without regret, and soon reached New York, and assumed command of the U. S. Mail Steamship Company's steamer "Georgia." This vessel was to carry passengers and mails from New York to Aspinwall to connect with the steamers on the Pacific coast, and a new field of observation was opened up calculated to impress the memory of events on one for a lifetime.

During the three months I had been absent the aspect of California affairs had materially changed. Then our countrymen, or at least those who called themselves "Americans," were flocking to the mines; but now Europe had opened her flood-gates, and crowds of foreigners were rushing towards California by emigrant ships as well as by the regular steam lines.

Among these foreigners were large numbers of Jews, who carried with them considerable property in merchandise and money, and, if their looks did not belie them, were a match for the shrewdest Yankee that ever came out of New England. There were many miners from Great Britain, as Australia's gold mines were then undiscovered.

People then were dreaming of a great empire to be established on the Pacific, few supposing that in a comparatively short time the Pacific Railroad would link that far-off region to the Union as closely as the

older States, and I have often been struck with the wild and romantic views of intelligent passengers, who could form no more idea of the grandeur to which this republic would attain than our forefathers could when they drew up a constitution for a nation of four millions of people which was destined to increase to such gigantic proportions.

Even at that early day there were not wanting those who predicted that in a few years California would command the commerce of the East Indies, which has always brought wealth and power to the nation controlling it. At the same time it was evident that California, with her one fine harbor, could hardly become a naval power if she attempted to walk alone, but, on the contrary, could easily be deprived of her supremacy in the commerce of the East, to say nothing of having her coast blockaded and her sea-board cities destroyed.

Thoughtful men no doubt saw in the future a great tide of emigration pouring into California from the empire of China, Japan, etc., which would require all our talents and energies to control,—an emigration in which certain of our public men think they see the direst consequences in the future, forgetful of the benefits these Chinese have conferred upon California.

During the earlier outpouring of gold-hunters from the United States, Europe, and Asia, I made several voyages with large numbers of passengers, the number exceeding in some cases the limit fixed by law. As a rule the crowd was a motley one, armed to the teeth with knives and pistols, and reckoning among their number some of the most lawless of our "border ruffians." From the great numbers of "cradles" which encumbered our decks a novice might have fancied himself on board of a floating asylum for foundlings, or in a bazaar ship, because the Israelites who formed part of the company on board, combining business with pleasure, held daily exhibitions of their goods, and sold them with a rapidity and at a profit which could not fail to carry joy to their mercantile souls.

Unaccustomed to the discipline of a ship and desirous of having their own way, the passengers gave a vast deal of trouble, and it sometimes seemed doubtful whether they or myself would command the vessel; but after the first few hours, and when we had become a little better acquainted with one another, no one cared to dispute my authority.

In one of these trips to the Isthmus I carried as many as seventeen hundred persons. At Havana the "Ohio" and the "Falcon," both from New Orleans and both crowded with passengers, met me, and after a great deal of discussion among the captains, I agreed to carry them all to Chagres in my vessel, being informed that steamers were waiting at Panama to take them to California. To provide for this multitude I purchased a dozen cook-stoves, and hired a number of colored gentlemen, the property of a planter on his way to El Dorado, to perform the duty of cooks. Not being able to purchase at short

notice the kind of provisions necessary for my hungry horde, I seized a large quantity of flour, bacon, sugar, tea, and coffee, the property of a gentleman connected in some way with the steamship company, who was taking these stores to California with the prospect of realizing large profits thereon.

This supply of provisions kept a large body of desperate men from giving serious trouble. The culinary artists were ordered to labor day and night, and to give all, men, women, and children as much as they wanted to eat and drink as long as the provisions held out; and as far as eating and drinking went I never saw a more contented set of mortals.

When the ship got to sea she fairly waddled along and rolled at the slightest provocation, so great was the weight on her decks, for we had accommodations for only about eight hundred persons below. Fortunately, the weather was warm and pleasant, but many had to remain on deck, where each man had (when it was possible) sixteen square feet chalked out for him, with his number in the middle of his reservation, where he could sit all day long if it so pleased him, and repose undisturbed at night on a luxurious mattress stuffed with corn-stalks, and supplied by the liberality of the steamship company.

There were few who had not some place to sleep, either on deck, on top of the wheel-houses, or in the hold, and the only serious complaint on this score that I remember was that of an Arkansas traveler, who, when he had been three days out of port, bewailed his lack of a mattress, and said that he had been sleeping on a sea-sick organ-grinder, who, having, with his monkey, recovered from the *mal de mer*, was now too much for him.

A philosopher might have asked himself, How can this cosmopolitan assemblage ever maintain a condition of law and order unless ruled by the hand of despotic power, such as is employed by the governments of continental Europe? How can people who have been ruled by the bayonet all their lives be controlled by laws emanating directly from the people,—their social and political equals? The problem was solved when these foreign emigrants reached California.

Many persons besides philosophers are aware that a small lump of leaven will cause a large amount of bread to rise, and the native-born citizens who had been educated to obey the laws were sufficiently numerous to restrain lawlessness in those who might otherwise have set all laws at defiance.

It was a study to notice how the various classes of people would assimilate with those of their own grade or calling on board. In the after-part of the vessel might be seen a knot of lawyers disputing together, some questioning the right of the captain to maintain order among passengers, others stoutly affirming his fullest measure of authority. Truth compels me to declare that these disciples of Coke were the most lawless portion of the passengers, but their disagreeable traits

were all in the line of their profession, and they doubtless hoped in the future to make out any number of good cases against the Mail Steamship Company for damages in overloading the ship with passengers. The venom was all taken out of these gentlemen, however, after I had circulated the champagne among them a few times, for I still had faith in the maxim that "the way to a man's heart is through his stomach."

Such a rush of emigrants from the centre of Europe was never before witnessed, and, although the circumstances of the case were so different, it reminds us of the irruptions of the barbarians who overran the Roman empire. The people who were coming in such numbers were so different in character from our native-born citizens, or those who, by long residence, had become like ourselves, that one might well feel anxious with regard to the future of California, and wonder if anarchy and confusion would not be her portion rather than a quiet settlement into one of the members of the great American Union. The result has demonstrated to the world that a republican form of government is the only one under which people can enjoy equal rights. That problem has long since been solved, at least for the present generation.

The majority of the hordes that swept over land and sea towards California were of the Scandinavian race, in which we include the Anglo-Saxon and other Teutonic races, men in whom nature has planted a love of liberty with courage to defend it,—yet who of all men have shown the greatest respect for law, only resorting to revolution when compelled by the tyranny of their rulers; among these people in California were the refuse of Europe and America, who, thinking themselves securely in the ascendency, endeavored to make murder and all other crimes appear venal offenses, if not virtues to be admired. When forbearance had ceased to be a virtue, and the laws were found inadequate to afford relief, the citizens arose in their might and decorated improvised gibbets with some of the most desperate villains who ever required the services of Jack Ketch.

California has now established her supremacy, and San Francisco is to-day the queen city of the Pacific, although a few years ago she was but an assemblage of huts and tents. Her palaces and warehouses are filled with the products of the world, and California is attached to the Union not only by law, but by those bands of iron which have crossed the continent to contribute to her prosperity. She commands the commerce of the East,—of China and Japan,—if she knows how to use her power by inducing our legislators to advocate and adopt those liberal measures which built up the mercantile marine of our great commercial rival, England, and do as England does, assist our steam lines in the Pacific until they are powerful enough to be self-supporting.

Among all the nationalities I have mentioned as voyaging in the steamer towards California, there was but one solitary Chinaman,—a dapper little Celestial, clean in person and neat in dress, smiling and

bowing as he squirmed his way through the crowd of passengers. Now he is on top of the wheel-house, now at the mast-head, trying to get a glimpse at a sail reported from aloft, now he is at the wash-tub professionally occupied with his employers' clothing. In the evening the Mongolian plays checkers with the sailors, and beats them every time with the blandness of his renowned countryman, the childlike Ah Sin.

Even "draw poker," "old sledge," and other scientific games were readily learned by this wise man from the East, while in the art of balancing a boat-hook on the end of his nose he stood without a rival. On the tail of his black alpaca jacket were paper Chinese characters representing his name, "Woo Hop," while certain other hieroglyphics on his breast indicated his descent from the Chang Woo dynasty. Woo Hop was a great favorite with everybody on board, was in "everybody's mess and nobody's watch," in fact, and it was a general remark that he represented more versatility and cleverness in himself than anybody else on board.

A passenger the first day out asked me who that queer-looking half-breed was with all the obsequiousness of the negro united with the intelligence of the white man. "That, sir," said I, "is Mr. Woo Hop, of the illustrious Chang Woo dynasty, who traces his ancestry back 3000 years B.C. He claims to be of the branch, 'Peran-Koo-She,' and, according to the belief of the best Chinese historians, is descended from Shem, the beloved of God. In that crowd of Yankees and Dutchmen he is like a drop of whisky in a bucket of water, his strength is not felt; but like the termite who leads the way for millions of his insect brethren, this Chinaman will bring all the Chinese out of Asia into California, and when a Chinaman once settles, there's no such thing as getting rid of him."

Some such remarks were made at the time in a spirit of badinage, but time and the march of events have rather justified my prophecy; and although I may be considered as resting under a delusion, I nurse my favorite theory, which, if it serves no other purpose, helps to amuse my friends, who laugh at my predictions, probably consoling themselves with the idea that *they* will not live to see them verified.

Woo Hop was not one of those servile Chinamen such as one now meets in the slums of San Francisco, and although not entitled to wear the insignia of the lowest grade of mandarins, he was sufficiently proud to sustain his claim to noble descent. When addressed as "John Chinaman" by the genial emigrants from Pike County, he would indignantly exclaim, "Me no wanchee callee me John Chinamanee; me namee Woo Hop; me washee close for me piece o' man, Maser Misser Smit. In my cuntlee you all same one boblailien; me no speakee you kiar, bime by, you know. Woo Hop all samee Melican fligate." No Christian could have expressed himself in stronger terms, for, though the Chinaman's language may be obscure to the general reader, it was

intended to show the contempt of a civilized being for an unmannerly outside barbarian.

The last I saw of Mr. Hop he was handling six trunks for his employers, making contracts with the Chagres boatmen, and cooking provisions for several parties prior to starting up the river. In the eight hours he remained in Chagres I will venture to say our Chinaman learned more about the country than any other passenger. His last act was to write his name on the superintendent's office, as a notice to other pilgrims from the central Flowery Kingdom who might travel that way.

For four or five years the tide of travel to California was unceasing. Europe and Asia poured forth hordes of adventurers, until the fabulous stories of gold discoveries in Australia diverted the stream of emigrants in that direction. A better class of people now formed the majority of emigrants to California from the Eastern States. Other lines of steamers were established, and passengers were carried with greater comfort at cheaper rates. Two hundred and sixty million dollars in gold and silver had been sent East, of which I transported about eighty million dollars. Stage lines had been started across the continent, a railroad was in contemplation, in short, California was considered a fixed fact, and a bank upon which the world might draw indefinitely without exhausting its resources.

Woo Hop had arrived in California, and soon communicated to his people at home wonderful accounts of the golden land occupied by the outside barbarians, which of right belonged to the Celestial Empire, for the Chinese consider other nations so much inferior as to be really their property, and if they do not take possession it is merely from their aversion to mixing too closely with people so far beneath them. His friends could hardly be persuaded that such a land as California did really exist, for the Chinese profess to believe that the flowery nation, the greatest on earth, is surrounded by water, and the land of the barbarians is a little island unworthy of notice.

Our friend Hop was therefore looked upon as a Chinese Ananias when his first dispatches arrived at Pekin. They reached their destination so quickly that it seemed as if he had some means of telegraphing across the water in advance of the laying of a Pacific Ocean cable.

When, in 1836, some English speculator announced to the Emperor Taon Kwang the invention of the magnetic telegraph, and proposed to run wires through all parts of the empire, His Majesty at once consulted his prime minister, the celebrated Shing-Tsoo-jin-hwang-ti, who pronounced it all "bosh." He asserted that the Chinese had used such a means of communication during the reign of Tu-he-she, 2205 B.C., and that mighty ruler, finding it to affect the virtue of the people, and to be the cause of much unnecessary communication between them, had abolished the affair as a nuisance.

Some of Woo Hop's friends, probably taking it for granted that if a tenth part of what that worthy had communicated to them was true it would pay to visit California, made their arrangements accordingly. One party, desirous of losing no time, chartered a junk for the ostensible purpose of going down the coast for a short distance, designing to seize the vessel and proceed to the new land where the outside barbarians were reaping the benefits which of right belonged to the children of the Flowery Kingdom.

Great vigilance was at that time observed over the movements of the people, and the distinguished Te-tuk, Admiral of the Imperial fleet, blockaded all the ports with a force of nine hundred and eighteen strong war-junks, manned by one hundred thousand men, together with twelve hundred vessels belonging to the river police. Notwithstanding the vigilance of the gallant admiral, the adventurers in the red-painted bottom, A No. 1 junk "Pwan Kang," succeeded in slipping out of the Yang-tse-Kiang one dark night when all the Imperial navy was asleep, and, throwing her bamboo sails to the breeze, she sped like an arrow before the wind. It was of no use to try to overtake the "Pwan Kang," for she could make six knots before a fresh gale and four knots on a taut bow-line. The escaping party were deficient in navigators and navigating instruments, but doubtless expected to pick these things up on the road. The last seen of these "California Pioneers" they were heading for the Lew Chew Islands, where it was supposed they would supply all deficiencies.

The "Pwan Kang" had hardly been gone a week before Admiral Te-tuk made an official report of the whole affair to the great fourth mandarin. The latter transmitted it to the third mandarin, he to the second, and the second to the first, who handed it over to Woo Ting, at that time prime minister. Woo Ting devoted three months to an elaborate investigation and laid the papers before His Celestial Majesty the Emperor, who said, "Let them go,—they will enlighten the outside barbarians in California, and teach them civilization and good manners. If," said the Emperor, "these wanderers should return, deal gently with them, express our regret that they should have left the Flowery Kingdom to consort with inferior creatures; chop their ears off and send them to serve as soldiers in defense of the frontier."

Fortunately, the adventurers escaped the paternal attentions of the Emperor, and have never since been heard from, although their friends in California, who arrived by a more certain conveyance twenty-seven years ago, are still expecting them.

There was a rumor current several years after the sailing of the junk, of a queer-looking vessel having been wrecked near the Fegee Islands. The crew were reported to have been all drowned; but taking into consideration the fact that some of the natives have since been seen decorated with Chinese pigtails, it is highly probable that the

unfortunate voyagers of the "Pwan Kang" were converted into soup.

Meanwhile, the people in San Francisco were delighted with the prospect held out to them by the urbane Woo Hop of the Chinese cheap labor on its way and soon to arrive in California.

Then every one was complaining about the high price of labor, and it was supposed that a Chinese "nurseman," at two dollars and a half a month, would be a decided improvement over a French *bonne* with watery eyes and a Corkonian accent, and that a cook who could make at least tolerable dishes at four dollars a month would be better than one who charged seventy-five dollars for the privilege of spoiling provisions.

Woo Hop was accordingly bored to death with inquiries about the friends he expected to join him in San Francisco, but his invariable answer was, "Belly plenty Chilese come blime bly all samee blakbellies you sabe." He was now the most popular man in San Francisco, and had it not been for the lingering remains of prejudice in favor of the Caucasian race he would no doubt have been sent to Congress. As it was, he visited every one's house in the capacity of a "distinguished foreigner," his almond eyes were pronounced "perfectly lovely" by the young ladies, and his pigtail was threatened with annihilation on account of the numerous locks of hair abstracted by his admirers.

With all his popularity Woo Hop was at times subjected to indignities and perils inseparable from the peculiar civilization which prevailed in the home of his adoption. Once some drunken miners shot at him, mistaking him (so they said) for an escaped baboon. At another time his pigtail was amputated by some mischievous rascals,—an event which filled Woo Hop with the greatest indignation, and he broke forth in the following words, addressed to one of his persecutors, "You Kistin piece o' man, me belly solly; me heathel man, me belly glad," after which he marched off with much dignity. The outside barbarian felt a touch of remorse, and called out, "Here, little nigger, is a gold-piece to pay for the shave," but Woo Hop did not deign to touch the coin.

The first lot of Chinese which arrived in California came by sailing-vessel, being more fortunate than their countrymen who sailed in the "Pwan Kang." They reached the Golden Gate without much discomfort, and were engaged as soon as the ship came to anchor at (for them) high wages as "nursemen," "washermen," cooks, etc. Few ventured to the mines, for they had little disposition to contend with the boisterous people in that quarter.

The Chinese had for some years previous to the gold discoveries been employed in different parts of the world under the name of "Coolies." In Cuba, particularly, they worked on plantations, and were really in a condition of abject slavery. Contracts were made

with these poor wretches to serve a term of years at the rate of three dollars a month, or thereabouts, a large sum to a Chinese laborer at home, but much less to the same person abroad. Rather than submit to the horrors of slavery many of the "Coolies" put an end to their lives in the coolest possible manner, while hundreds died from home-sickness, and few indeed ever returned to China to tell the story of their sufferings.

Hundreds of these poor people were enlisted to build the Panama Railroad. By permission of the Chinese government the Chinese laborers were to serve until the road was finished, with the strict understanding that *all* were to be returned to their native land at the expiration of that time, the living as they had been sent out, and the *trepassé* (their bones) snugly packed in boxes, to be deposited with those of their ancestors.

Whether the terms of this contract were strictly complied with I do not know, but Woo Ting, the great prime minister, suddenly discovered that the population of the empire was increasing to an alarming extent, that rice was rising in price, and that the supply of dogs, rats, and other vermin was diminishing in a frightful ratio. He therefore advised the Emperor to permit the worst of his subjects to go abroad and sow the seeds of civilization and the sublime doctrines of Confucius among all the tribes of outside barbarians tributaries to the Celestial Empire.

It can readily be imagined that with a country of three million square miles of territory, containing four hundred millions of people, the prime minister, who was responsible for their being fed, should wish to lessen his labors as much as possible by doing all in his power to facilitate the exit of his countrymen. Hence it came to pass, as California gradually filled up with new-comers from Yankee-land and Europe who would work only at very high wages, that Woo Ting, instigated by Providence, sent out in the nick of time Chinese laborers as fast as transportation could be procured for them.

"Let them come," said the jovial pioneers of California; "we shall want all we can get to wait on us and build our railroads."

When the Panama Railroad was finished a fresh stream of people was swept Californiaward by the Pacific mail steam lines, consisting of some of the finest ships in the world; and the Nicaragua line, although not quite so fine, carried thousands of passengers, quicker, cheaper, and dirtier than their rivals. By all these lines the Chinese laborers who had worked upon the railroads were seen proceeding to California, where, upon their arrival, they were all absorbed, in fact, were considered a "national blessing."

The important questions, whether the Chinaman was white or "colored," whether he should be allowed a vote, in fact, whether he had any rights which an Irishman or German was bound to respect,

had not then agitated the public mind, but it seemed to be tacitly understood that John could work as hard as he pleased for as little as he pleased, and when he wished to return to the Flowery Kingdom there would be no objections to his taking his earnings with him.

Some of the more intelligent classes spoke of the Chinese as "Mongolians," which others translated into "mongrel," and came nearer to the mark than they imagined, probably, as the Chinese are a mixture of various races, with a dash of the Caucasian, which they get from the Western Tartars, who have some European characteristics,—long beards, slender figures, etc. There is not, however, enough Caucasian blood in John, according to D. K——y and other excellent authorities, to allow him a vote under any circumstances. Had he been allowed the privileges of a citizen, says K——y, he would long ere this have overrun the United States, and established here the same form of government which has existed in China since the days of the illustrious Peran-Koo-She, who, as everybody knows, reigned ages before the sublime Ta-Tu, who died in the year 2205 B.C. This terrible catastrophe has thus far been averted by treating the Chinaman pretty much as we formerly treated the negro, although allowing the former some little credit for politeness and filial affection.

It occurred to the Pacific Mail Steamship Company at last that it would be a good idea to establish a line to China and Japan to supply California and the East with teas and silks, and any stray "Mongolians" who might desire a passage to the land of gold, and could raise the money to pay for it. From this time the steamers were packed with Chinamen going and returning, many of the latter packed in boxes, having given up the ghost far from their beloved country, but consoled in their last hours by the assurance that their mortal remains should be deposited near the bones of their ancestors. Notwithstanding the crowded condition of the steamers stuffed full of emigrants, hold, steerage, coal-bunkers, in fact, every place where a Chinaman could be wedged, they gave little trouble, behaving with that decorum which is inculcated by the sage Confucius, by whose writings all the Chinese are regulated.

In 1860 there were at least forty thousand Chinese in California, and there was no objection to them then among respectable people. The Californians were thinking what a fortunate circumstance it was that there were so many thousands of hard-working people available to build the contemplated railroads, and do all the other drudgery at one-third the price charged by white men.

The bulk of the Chinese emigration settled in San Francisco, and took possession of a quarter of the city by themselves, which obtained the appellation of "Chinatown." Here they herded together in buildings somewhat after the style of those in Hong-Kong.

In these simple domiciles they live in apparent comfort and content,

maintaining their national customs and local regulations without, so far as we have learned, questioning the propriety of outside barbarians dwelling in magnificent houses and selling their shoddy wares from equally magnificent shops.

Some went to the mines to work over the diggings abandoned by the Caucasians as "worked out," getting rich on placers where white men would have starved; many fishermen came over and settled along the coast to ply their calling and supply the market. People thought this was as it should be, for no self-respecting Caucasian would stoop to the ignoble business of catching fish as long as he could make more money in mining gold.

The Pacific Railroad was commenced, and thousands more of the Chinese came over to help build it and bring California within six days' travel of the Atlantic States. When the road was finished,—a result for which we are greatly indebted to Chinese labor,—the fact became apparent that ere many years a great commerce from China and Japan would pass through the Golden Gate to the Eastern States, and to Europe. We seemed destined to command the greater part, if not all, of the commerce of the East.

In former times the nation which controlled the commerce of Asia attained the greatest power, and this is one leading cause of the present importance of Great Britain in the family of nations. Why should we not take from her the wealth of Oriental commerce as she has taken it from other nations? Simply because British statesmen are not hampered by sectional or local considerations, but comprehend the requirements of the whole empire, and maintain a navy adequate not only to protect their island coast, but, in case of necessity, to defend their interests in every quarter of the world.

It were vain to tell of the persecutions the poor Chinese underwent in California after the completion of the Pacific Railroad. By that time there were at least sixty thousand Celestials in the State, the majority of the lowest class in the social scale, and they were despised and hated by the Americans and Europeans who were living, in the mountains of California, lives as rude and as savage as their ancestors when subjugated by Cæsar.

Even the lowest class of Chinese are imbued with a certain amount of native politeness which requires long contact with the outside world to eradicate, and filial piety they consider the crowning virtue. It seems a little singular that such a people should be considered outside the pale of civilization, and be subjected to the ignominious treatment awarded to slaves and savages.

Notwithstanding all the outrages practiced upon the Chinese after their usefulness had waned, they have multiplied in California in a remarkable manner, and the prime minister, Woo Ting, must feel gratified that he has provided for so many of his countrymen, who stick to

California with all the tenacity of their European persecutors. Only give a Chinaman a foothold, and he will soon attain the largest proportions of which he is capable.

To-day there are said to be sixty thousand Chinese in San Francisco, and forty thousand more distributed throughout the State,—which is about one-seventh of the entire population,—showing that the Chinese have landed proportionally a larger number—taking their means and facilities into consideration—than the whole of Europe and America combined.

If objections to the Chinese were based solely on political grounds there might be some plausibility in them, for so young a nation as ours is naturally in doubt as to the stability of institutions peculiar in a measure to ourselves, although the most peculiar one of all has lately gone by the board without swamping the ship of state. It may be natural, then, for timid souls to fear the effects of the unlimited emigration of the subjects of an empire which has existed for more than forty centuries in a state of civilization so different from our own, a nation which has survived the assaults of Scythians, Huns, and Tartars through long ages, and has constantly increased in population and extent of territory from the days of Peran-Koo-She (2525 B.C.) to the year of grace 1879.

Not that the Chinese have been exempt from the troubles by which other countries have been harassed, for the Huns, Tartars, and Mongols gave them a vast deal of trouble, and the two latter nations for a time formed a large element in the government of the empire; but these were finally absorbed and, as it were, lost sight of in the immense population of China, and the countries whence they came now form a portion of the Emperor's dominions.

In spite of numerous revolutions, multitudes of bad rulers, etc., China has never changed her form of government, a conservatism which should command the admiration of all true British tories. When China was in her zenith as a civilized nation all Europe was groping in barbarism, and centuries later Cæsar and his legions found the ancestors of most of the present inhabitants of Europe fierce and ignorant, dwelling in habitations of the most primitive description.

Under all the circumstances of the case, I do not see upon what ground we can classify the Chinese as "uncivilized," especially since we admit the most ignorant negroes of the South to all the rights of citizenship. Certainly, it seems absurd to exclude Chinese from our territory because they perform certain kinds of labor at low wages.

We should do the best we can with them, and endeavor to make good citizens with whom we can assimilate when the time comes for the Chinese race to preponderate on this continent and establish a Mongolian dynasty! When that day arrives the native American citizens who are then above ground may be received into favor at the Imperial

court, and perhaps fill those places once appropriated by the Mantchu Tartars, formerly the chronic office-holders of China.

This idea may seem childish to the superficial reader, who has been taught to believe that the Anglo-Saxon race is the only one at present worth mentioning, and that where they have gained a foothold they will root out all other peoples who may stand in their way. As a proof of this they point to the conquests of England in every part of the world, and to our own progress on the continent of North America in the last two centuries and a half. In reply to all this and much more that might be said on the subject, I will remark that England has maintained her footing in India and extended her empire by arraying one nationality against another in a country inhabited by different races bitterly hostile to each other. It would be very different in a country like China, forming one vast homogeneous mass, where at this day England could not maintain a footing one month's march from the coast. England has done everything in her power in late years to make her rule palatable to her Asiatic subjects, even to complimenting them by making the Queen of England their "Empress." In fact, our Anglo-Saxon friends across the way seem to have a tact which we do not possess. They manage to live in amity with savage tribes who would burn us at the stake if they could get hold of us.

We Americans have adopted the theory that this continent is for our exclusive use. Nearly all of us are in favor of exterminating the Indians, some would apply the same process to the negro race, and now Mr. K——y and his associates have decreed that "the Chinese must go;" yet at least two of these classes are, if properly utilized, a vast source of wealth to this country.

When we look carefully into the political philosophy of the Chinese we see much to admire, notwithstanding the defects with which time has incrusted it, and the close observer would no more compare the lower grades of Chinese, who form the great mass of those we encounter in California, with even the middle class, as seen in their native country, than he would compare a Satyr with Hyperion.

I will not enlarge on what has been so often noted, that we are indebted to the Chinese for many of the arts which are considered to be triumphs of modern civilization. 1200 years B.C. their emperors were arrayed in the finest silk fabrics; their china, glass, and pottery were excellent; their palaces were magnificent; and from that epoch has been handed down all the gorgeous paraphernalia of courts which has served as a model for the sovereigns of Europe. Their palaces, if not equal to those of modern days, were not devoid of beauty, and their feasts, if different from those of Lucullus, were excellent in their way.

All the various departments known in the governments of the great nations of to-day were familiar ages ago to the Chinese. Their statesmen conducted negotiations very much as at present. The most astute

diplomatists of to-day are Chinese, and no nation has in the end ever obtained the better of them in the art of diplomacy. Some of their public works are unequaled. The great wall of China may well be ranked as one of the wonders of the world, being fifteen hundred miles in length and wide enough on top for six horsemen to ride abreast. This work of the usurper "Che-Kwang-Ti" stands to this day a monument to his energy; the most stupendous of the works of man; unsurpassed by the pyramids of Egypt. Che-Kwang-Ti was one of the most eminent men that his country has produced, though addicted to cruelties which have ever formed part of a Chinese emperor's policy. When he proposed his famous barrier against the Tartars, the Chinese literati—many thousands in number—strongly remonstrated against his proceedings, and recommended an adherence to the customs of former emperors,—that is, oppose no resistance to the Tartar hordes, trusting that the latter would soon be absorbed by the great Chinese race, or that they would all get the dyspepsia from living too luxurious a life, and would be glad to get back to their barren steppes.

It seems that Che-Kwang-Ti, disgusted with the satirical observations of the literati, ordered one thousand of these gentry to lose their heads and all their writings to be destroyed. He then ordered the beginning of the Chinese empire to be dated from that time, with himself chronicled as the founder thereof. Perhaps the Emperor served these scribblers right, and we have lost nothing in the destruction of their books, since the works of the great Confucius, the master-spirit of them all, are still preserved to us.

However, the destruction of these books has given an excuse for the confusion which prevails in the classics and annals, and which the most learned of the Chinese are unable to rectify.

The mighty Che-Kwang-Ti died detested by everybody, which is generally the case in this world with rulers of all descriptions. Even in our own enlightened country affection only lasts while a citizen holds office, and then to be sure it is very strong, while in regard to the respect shown to the dead who have exercised authority, the Chinese are superior to us in this as in perhaps other particulars.

While mentioning the subject of the great engineering feats of the Chinese, let us consider the great canal seven hundred miles long, its branches connecting with innumerable rivers, which serve to transport merchandise from one part of the empire to another. On this system of inland navigation is a tonnage in junks and boats estimated as greater than that of all the world besides! This work is worthy of any engineer now living.

Many of their public buildings are well worthy our admiration; and in landscape-gardening and farming the Chinese are unequaled. In naval architecture their models, it must be confessed, do not quite come up to our ideas; but after all, those things are matters of taste,

and perhaps there are merits in a Chinese junk of which we cannot form a proper conception; and, to say the truth, we cannot boast a great deal of our own naval craft. As to their literature, who have we to compare with Confucius, whose works have stood the test of more than twenty-four centuries? Benjamin Franklin comes the nearest to him of any of our worthies, and it is to be hoped his memory will endure as long. Strong common sense is the leading characteristic of both these philosophers,—a valuable quality, at present quite out of fashion among the savans of to-day, who are constantly pushing forward new theories before they have tested the old ones, presenting their changes of opinion to the bewildered public with the rapidity of the changes of a kaleidoscope.

I am not sure that we could not take a hint from the Chinese in the matter of education. It is in mental attributes rather than in physical in which the Chinese excel, and we could do well by reforming in some degree the mechanical tendencies of the age, and refuse to waste our lives in pursuits which, however dazzling in appearance, bring no real happiness to the human race, but, on the contrary, wear out the faculties of mind and body and decimate our population.

The works of Confucius may not to the casual observer compare in style with our English classics, but there are no writings which have exercised such an influence over the human race. They have kept the vast empire of China under subjection to the law for twenty-four centuries, and their leading idea is to promote the cause of virtue. One of Confucius's works is a book called the "Chun-tsew," which does not by any means, as the sound of the name would signify, refer to something to eat. The title is analogous to the Greek *χρονολογια*, the method of obtaining the true period of years in which past events took place. This clever book is constantly referred to by the literati,—of whom there are at least one million mentioned in the Cyclopædia of Chinese authors,—every one of whom has commented upon the maxims of Confucius, in one shape or another, until he has made a book of his own, a practice which has been followed by the million of Shakspeare "commentators" of our own day, who have so turned and twisted and befogged the utterances of that mighty genius that it is next to impossible for anybody to make head or tail of them. The "She-King," or book of odes, contains a collection of songs showing the versatility of Confucius's genius, and his "Ta-Heo" is replete with sound principles, and is much quoted by literary Chinese. It would be impossible, however, to mention the names of a tenth part of the leading classics of this peculiar people, for they are eminently a literary race, and literature is held in greater honor with them than anywhere else in the world.

In their religion, judged by our standard, the Chinese do not appear to advantage. It is to be feared that the most of them care very little for any system of worship, but will take up with the one which pays the

best, or, in fact, worship anything, from a grasshopper to a teapot. The fear that they may impress such loose theological notions upon our own people is perhaps the strongest argument that can be made for their exclusion.

The system of Chinese ethics is of a very elastic nature, suited to the genius of the people. Before the days of Confucius they appear to have worshiped anything they pleased. The little religion they had originally possessed seems to have evaporated. So when Confucius appeared with his system of ethics, the people worshiped him with blind adoration, traveling about with his maxims written on their clothing, that all might read as they ran. About the year 250 B.C. Buddhism was introduced by priests from India, and it spread with great rapidity. Subsequently, when the Mohammedan missionaries visited China, their doctrines were so popular that this might have become a leading religion in China were it not for the prohibition of pork as an article of diet. Then followed the Roman Catholics, the first Christian missionaries to China. Six or seven hundred thousand converts were the fruit of their arduous exertions, and the bulk of their converts' descendants have held that faith to the present time. How much real Christianity exists in these people, a mere handful in the millions of unbelievers, it would be perhaps impossible for us to determine.

The rulers of China have rather discouraged the people from adopting any belief whatever. They do not wish the masses to indulge in religious speculations, lest they will be more difficult to govern. One of their emperors illustrated this in a peculiar manner. He published a review of the principal religions known to the Chinese, including those of Buddha, Mohammed, and Jesus Christ, and wound up his observations by recommending his subjects to have nothing to do with any of them! What a nation this might have become had the doctrines of Christianity prevailed throughout the empire! With that religion would have come a knowledge of the highest branches of science and philosophy; the arts would have flourished, and the Chinese would long ago have taken a commanding position among the nations of the world.

The time may yet come when the joss-houses will be overthrown and the Chinese adopt the true faith, which will confer all the blessings of heaven upon them in this life as well as the assurance of a happy hereafter. This change will not occur in their own land, but in one of their adoption, and centuries may elapse before the event takes place, so thoroughly conservative are the Chinese.

The Chinese appear to have reached the zenith of their civilization soon after the time of Confucius. Not to advance is really to retrograde, and we accordingly find that manufactures have deteriorated, the arts and sciences have not flourished, great inventions have been lost, and valuable literature has perished. The Chinese claim that all our

greatest inventions were known to their ancestors, and although we may doubt their story we cannot prove the contrary.

Now, this is the people that steamships have brought within twenty-one days of our coast, and whom in the future we shall have to face. Up to the present time they have come only by hundreds, but the time approaches when they will come by thousands. Their presence already disquiets the people of California, who fear the influx of a vast number of cheap laborers, who might be considered a boon in many other new countries. But a deeper problem will require solution in the course of the next century, and this country must be prepared to meet it.

The United States and China have reciprocal treaties by which the citizens of the one are allowed nearly the same privileges as the subjects of the other, and mutual protection under the laws has been guaranteed to each. A Chinese minister plenipotentiary has lately taken up his abode in Washington, and when he commences correspondence with our accomplished Secretary of State in relation to the wrongs received by his countrymen in the United States, I very much fear that the equity of the argument will be on the side of the Chinese. The latter, among their qualifications, are subtle diplomatists, and contest their points not only with pertinacity, but also with great ability.

As long as steamers continue to run between China and California they will bring Chinese emigrants, and many of a better class are coming over, because reports of the mineral wealth of the country have been widely spread, and every man is anxious to participate in the riches of which they hear so much. The Chinese will keep on coming until they become a power in the land, and no one has yet pointed out an effectual means to prevent them from coming.

Who knows but that in the future the Chinese will make the best of citizens, belonging, as they do, to a race which for four thousand years has been controlled by a power which they could annihilate in a moment if so disposed? Perhaps the Chinese are a blessing in disguise, and God is leading this benighted race from the land of idolatry to plant them in a Christian country in order that they may reap the benefits of Christianity. Who knows but that they will become a necessity to our land, clearing up those immense tracts of desert and swamp where no one as yet has dared to settle, providing food for the constantly-increasing population of the world? No one can tell what are the designs of Providence, or how soon they may be realized.

Suppose we forbid by legislation the immigration of Chinese, what will be the result? In the first place, we violate our solemn treaty obligations, and forfeit our character as a nation by such dishonest dealing. In the second place, the Chinese government will in retaliation lay such restrictions upon American commerce that we will suffer severely, more particularly when we begin to build up our trade upon the ocean, supported by so small a navy as we possess. In fact, all the flattering

illusions in which we have been indulging of one day controlling the commerce of the East will vanish "like the baseless fabric of a vision."

The Chinese, Cochin Chinese, Japanese, Coreans, Burmese, and all the other nations of the East will look upon the Americans as hostile to them, and will treat them accordingly. Our theoretical policy is "peace and good will towards men," and in the Declaration of Independence we affirm that "all men are created equal." When these maxims are cast back to us, are we to confess that they are mere "glittering generalities,"—in other words, arrant humbug?

If we were to go to war with China, what chance of success would we have? If we were to land an army it would soon be crushed by the enemy's mere weight of numbers, or perhaps absorbed as the Tartar and Mantchou invaders were of old. The Chinese could arm millions of soldiers with modern weapons, and could drill them in the tactics of Europe. Suppose we sent our naval forces to operate against the Chinese, they could not succeed against the breech-loading cannon which the Chinese have been mounting for many years past. They have naval stations, ironclads, and swift steamships, managed by Europeans. They could cut up our ocean commerce, and their swarms of desperate pirates, let loose by the Chinese government, would inflict injuries upon us from which it would take years to recover.

Of course we could inflict upon the Chinese a great deal of damage, but they are accustomed to that, and would not greatly mind the burning of fifty or sixty towns and the slaughter of a million or so of inhabitants. Human life is held in comparatively slight estimation among this singular people, and it might even be deemed a lucky method of getting rid of their surplus population.

After we have forbidden the Chinese landing on our shores, and thereby caused them to doubt the sincerity of our Fourth of July manifestoes with regard to the freedom and equality of all men, they will naturally yearn to taste again the flesh-pots, and will direct their attention to the vast territory of British Columbia. They will come across the Pacific in steamers and sailing-vessels, many of them doubtless in junks, and landing on the shores of the Straits of Fuca, will gradually progress far northward, receiving British protection, and without fear of molestation from the Indians and the scattered white settlers in those melancholy regions. In a few years we might expect to see the Chinese working their way across the Cascade and the Rocky Mountains, and along the great plains which lie to the northward of the boundary-line between the United States and British Columbia, and they would once more come in contact with our people in Washington Territory, Montana, Dakota and Minnesota, where the rough frontiersmen would be casting sheep's-eyes at the almond-eyed damsels of Cathay, hoping to secure a cook or washerwoman. They would next be fishing in Lake Superior, and who could prevent them?

England would not object to this influx, for it is her policy to people the immense deserts which lie to the northward of the forty-ninth parallel, and she is accustomed to the task of governing all sorts of strange people.

The Chinese would not trouble England, for they would be so far removed from the settlements of Canada that their presence for many years would not be felt any more than that of the Indians who roam over the country at present. Sitting Bull and his band are now living quietly under the "meteor flag of England," raising their own potatoes and going to Sunday-school regularly, yet when these interesting savages were on our side of the line, although treated with the most distinguished consideration, and provided with board, lodging, washing, and pocket-money, they kept the United States of America in a hubbub from one year's end to another, and all because we did not conform strictly to treaties which we never ought to have made with them.

A few centuries pass away and the Chinese settlers increase and multiply, large towns grow up on the borders of the Straits of Fuca and the many harbors and inlets to the northward. The sails of their junks are everywhere whitening the waters. The great Green Dragon Line of steamers of the "Whang Foo Company" is daily landing thousands of passengers from Hong-Kong, with all the Chinese appliances for comfort. The coast is studded with bamboo villas, great commercial houses have been established like those in Hong-Kong and Canton, Christianity is spreading among the people, and in two centuries, to speak within bounds, we shall have a rich, powerful, and aggressive nation governed by Chinese laws, and dominated by Chinese habits and customs, which for so many ages have kept this people substantially a unit.

It is not unlikely that such a people, living in the hardening climate of North America, and leading a more robust life, may produce great leaders, not statesmen like Webster, but rulers like the great Kublai Khan, the founder of the Tartar dynasty in China. The Tartar conquerors of China by leading luxurious lives lost much of the original prestige of their race, but there is enough of the old Tartar and Mantchou blood left in China from which to leaven a race of conquerors. Nursed in the cradle of the storm and snow, and inured to every kind of hardship, they would reproduce in the time to come the ancient hordes of Scythians, who, from the frozen regions of the north, have overrun many civilized countries.

It does not take many centuries for a nation to change its physical condition when transplanted from a comparatively enervating climate to one where great energy is required to maintain existence. The Chinese would soon improve morally and physically, and attain the standard of the heroes of past ages whom poets have delighted to

honor. It may seem absurd to speak of Chinese peopling the wilds of British Columbia, but if Esquimaux can grow fat on the shores of the frozen ocean, and patriotic officers and men of the various navies of the world delight in picnicking around the North Pole, what is to prevent a Tartar-Chinese race from peopling a country which, to say the least, is no worse than the steppes of Asia, whence their ancestors originated?

Who can say but that in the course of time—say two thousand years—they may cross Baffin's Bay, reach Greenland, discover the North Pole, pass through Sweden and Norway, and stand face to face with the Russian bear at St. Petersburg! But perhaps this is looking too far into the future.

Were we to wage war with some twenty millions of people, one-sixth of whom would be soldiers, armed with the most approved weapons, they could bid us defiance for centuries, especially if our Congress in that epoch wasted their time in debating whether the general should command the army or the army should command the general. The Chinese would wage unrelenting war against us until the border line was deluged in blood, and the border States gradually would form part of the Chinese territory. Here would be a fine market for British manufactures and Canadian breadstuffs secure from all competition on the part of the Yankees, who by that time would be too demoralized even to turn an honest penny.

Admit that we could raise a great army to drive out these so-called barbarians, the latter, by means of their steamers, could bring over ten soldiers to our one, and we should be inundated by an irruption of millions of Chinese and Tartars, who, after all our troops were cut to pieces, would swarm over the fertile fields of America. The final result of all this no one can foresee, but we can imagine from the turbulent scenes that have been enacted on this continent since the first settlement by our ancestors, that we shall be subjected to the same mutations which have fallen to the lot of other countries, and those nations which have the power will take advantage of the opportunity offered to better their own condition at our expense.

Three hundred years seems a long time to look forward, but it is only a span in the life of the world, and the history of past times shows how easily great revolutions can be brought about where wisdom and justice have ceased to prevail in the councils of a state. Our country may yet figure in history as a bright meteor that for a brief period dazzled the world and then disappeared forever.

During the century in which the United States has had an independent existence our country has astonished the world by her rapid progress, but our career has been checkered by at least a fair share of incidents. Blessed with material prosperity, we have lived beyond our means; we would vie in luxury with the nations of Europe, and our youth is threatened with diseases usually peculiar to old age.

Perhaps in the career of Rome is foreshadowed our own fate as a nation. She passed from monarchy, through various grades of republicanism, to the most absolute despotism. The same causes which brought about the downfall of the Roman republic may precipitate that of our own.

The United States has claimed to be the model government of the world, the refuge of all people suffering from tyranny in their own country; in fact, a political elysium, if such a thing could exist on earth. She has published to the world that all men are created equal and entitled to the benefits of our laws, when in fact we do not hesitate to take the most ungenerous course against those who have been of the greatest service to us, thus securing the enmity of over three hundred millions of Asiatics and commencing a controversy of which the present generation may not witness the termination. It is then not unlikely, amid the troubles which will in future centuries beset our country, the Chinese Tartars in British Columbia will take advantage of the events occurring among our people. The spirit of Kublai Khan may spring forth in a new form, modified of course by circumstances, change the whole face of affairs, and carry devastation through every part of our country.

The invasion will be perhaps as sweeping as that of the Gauls under Brennus, who overran all Italy, and finally laid Rome in ashes. Yet the Celtic and Gallic tribes were as nothing compared with the four hundred millions of Chinese and their fierce tributaries. Ancient history abounds in instances of extensive and rapid conquests; and the Chinese, once let loose upon the United States in the manner I have indicated, would devour the country and its inhabitants as the grasshoppers absorb the wheat-fields of our Western farmers.

The Anglo-Tartar-Chinese of the future will leave British Columbia without regret to riot on the possessions of our unfortunate descendants, for it is fair to suppose that the latter, following our example, will have neglected the profession of arms and the means of national defense, which can alone preserve the freedom of a nation. History is always repeating itself, and we can see in the fate of those who have preceded us the probable doom of our posterity.

Where are the once all-powerful Jews? Scattered all over the world, with no country they can call their own. Where are Troy, Thebes, Nineveh, Babylon, Carthage? The abode of foxes and owls. Where are the great empires of Xerxes, Alexander, and the Pharaohs? They have left scarce "a wrack behind." The learning and splendor of ancient Greece and many nations of a later date are among the things which were. We scarcely know of them except by tradition.

The history of China offers a startling contrast, however, to that of Rome. While the latter was attaining the summit of her glory as mistress of the world, passing through all varieties of government in less

than a thousand years, China, without material alteration of government or institutions, has continued on for forty centuries at least. While Rome to-day derives its sole political importance from its being the capital of one of the kingdoms of Europe, Pekin gives laws to a large part of the Eastern continent. All that remains of the capital of the Cæsars is a little area crowded with ruins, which seem to have shrunk abashed into a corner like a beggar clothed with the remains of former magnificence.

China owes her long existence to her conservatism and close adherence to the government and maxims of her founders. She shows no symptoms of decline, and it is by no means improbable that within the next thousand years she will have one of her viceroys ruling over British Columbia. Nay, even the Capitol at Washington may become the palace for a line of Chinese princes!

What a pleasure it would be to many people now on earth if they could live under a dynasty where "knock head and rub nose" was the court etiquette, and where the *San-Kwee-Kew-Kow*, "thrice kneeling and knocking the head nine times on the floor," was constantly practiced!

No doubt many would try to prolong their existence if they thought such an aristocratic condition of affairs could be brought about inside of a century; and for their sakes we must regret that the signs of the times portend no change in so short a period.

If the misfortunes I have indicated should overtake our country, it will be because we go directly counter to the advice of Washington, and in time of war prepare for peace—because we endeavor to set aside our solemn treaty obligations when it no longer suits our purpose to fulfill them, and daily give the lie to the professions we have been making since the foundation of our government. To this may be added the attempt to flood the country with a wild-cat currency at the very moment when we have attained an honest standard. Few nations can stand such a pressure, and we will succumb to it in the end unless we mend our ways.

DAVID D. PORTER,
Admiral U.S.N.

EDITORIAL NOTES.

It is gratifying to be able to state that the first number of The United Service met with a success which realized the highest anticipations of its conductors, who have to acknowledge the kindly notices and generous support which it received on all sides. The unexpectedly large demand for it (which soon exhausted the first edition) proves that there was a demand for such a publication, and the flattering reception which greeted the Quarterly seems to indicate that it supplied the demand to the letter. Allowing this (the second) number to speak for itself, we will state that the next shall be a still more brilliant one. It will include several articles of exceptional interest by some of the most distinguished officers in this country and Europe.

Owing to the non-receipt in season of the manuscript, the second part of Lieutenant Cochran's valuable article on "The Naval Brigade and the Marine Battalions in the Labor Strikes of 1877" is omitted in this number, but it will be published in the next. Several other articles already in type, including a gracefully-written one on "A Summer Cruise with Farragut," by Medical Director Shippen, U.S.N., are unavoidably left over till the next number.

The Forty-fifth Congress adjourned on the 4th of March without having passed any of the several bills presented looking to the reorganization of the army, and without having passed any laws of importance relating to either the army or the navy. The failure to pass the principal appropriation bills, including that of the army, in consequence of which a special session becomes necessary, is a double calamity,—first, in the expense which the special session will entail upon the treasury, and, second, in the disturbing influences which it is likely to exert upon the business interests of the country.

In view of the measures now under discussion having in view the reorganization and assimilation of the militia of the different States of the Union,—making the force a "national guard" in fact as well as in name,—it is of interest to know that a somewhat similar movement is also on foot in Great Britain. A committee appointed for the purpose

have just presented a comprehensive report to Parliament on the subject of the volunteer force of the kingdom, making suggestions as to the means of increasing its efficiency and of assimilating it as closely as possible to the regular army. The principal points of the report may be noticed as follows: An Active Service Legion of the Volunteers is not recommended, as the present militia answer the purpose; the government should pay all the expenses of uniforming, equipping, and camp-training of the volunteers; the force should be so organized as to make mobilization simple; stringent measures are not recommended for making the attendance of the members compulsory on more than a limited number of parades; suitable schools of instruction should be established for the officers of the various corps; regimental camp-service to be provided for and required; regular army officers to be detailed as regimental adjutants; the force to be uniformed and equipped like the regular army; a volunteer medical force to be formed, and a certain number of the volunteers to be instructed in ambulance service. It is recommended that the maximum strength of the force be placed at two hundred and fifty thousand.

THE case of Private Hines's trousers, which has recently become public, and which has been made the subject of many amusing paragraphs in the papers, in addition to being cited as a frightful example of "red tape" in the army, is not without parallel in foreign services. A late number of the British *Army and Navy Gazette*, in noticing the death of Captain John Vivian, ex-Under-Secretary of State for War, relates a story to the effect that while the captain was in Parliament, and opposed to the Ministry, he took a particular delight in holding up to ridicule the blunders and circumlocution of the War Office. In one of his speeches, some years ago, he raised a laugh, in which even the Secretary of State for War was compelled to join at his own expense, by detailing the following incident: A commissary at Curragh Camp, Ireland, sent in a requisition for a bellows. The requisition went from Curragh to Dublin, from Dublin to London, from one bureau of the War Office to another, and, finally, by mistake, to the Admiralty, where it was entombed beyond hope of resurrection. The last heard of that unfortunate Curragh commissary, said Vivian, in conclusion, "he was still bellowing for his bellows."

IT is a fact worthy of notice that, while no regiment could be got ready in less than a week or even a fortnight to leave Portsmouth, England, for South Africa, in the recent movement of British troops, a force of Royal Marines, equivalent to three regiments, would be ready to embark, thoroughly equipped, within twenty-four hours of the receipt of

orders,—for which they applied, so anxious were they to take part in the Zulu campaign. The marines are frequently made the object of much jesting and of some little depreciation, both as undeserved as they are ungenerous, but it must be said to their credit that they are not only always willing, but, what is of vastly greater consequence in emergencies, are always *ready* to perform their own duty and to volunteer for that of soldiers and sailors. If the marines do not distinguish themselves as frequently as their comrades in arms do, it is only because they have not the opportunity of so doing. Their services during our labor riots of 1877, and their readiness for duty in the Zulu war, not to name many similar instances which could be cited, entitle them to the highest praise.

THE official announcement of the death of Shere Ali, and the succession of his son, Yakoob Khan, as Ameer, point to an early and satisfactory settlement of the Afghanistan war. It is stated that the new Ameer is disposed to come to terms, and as the British are now in possession of all the most important places in Afghanistan, which will give them commanding advantages in case it should be necessary to continue the campaign, it is probable that he will seek to make the best conditions he can while he has a favorable opportunity, so that news of the preliminary negotiations for peace may be looked for daily.

THE January number of the Berlin *Jahrbücher für die Deutsche Armée und Marine* contains an article on the use of Field Artillery in our late civil war, the history of which is rapidly gaining a greater interest for foreign officers, as they begin to understand the value of the many practical lessons to be learned therefrom.